OPERATION MANUAL

SYSTEMS, INC.

COM - 120B

COMMUNICATIONS SERVICE MONITOR

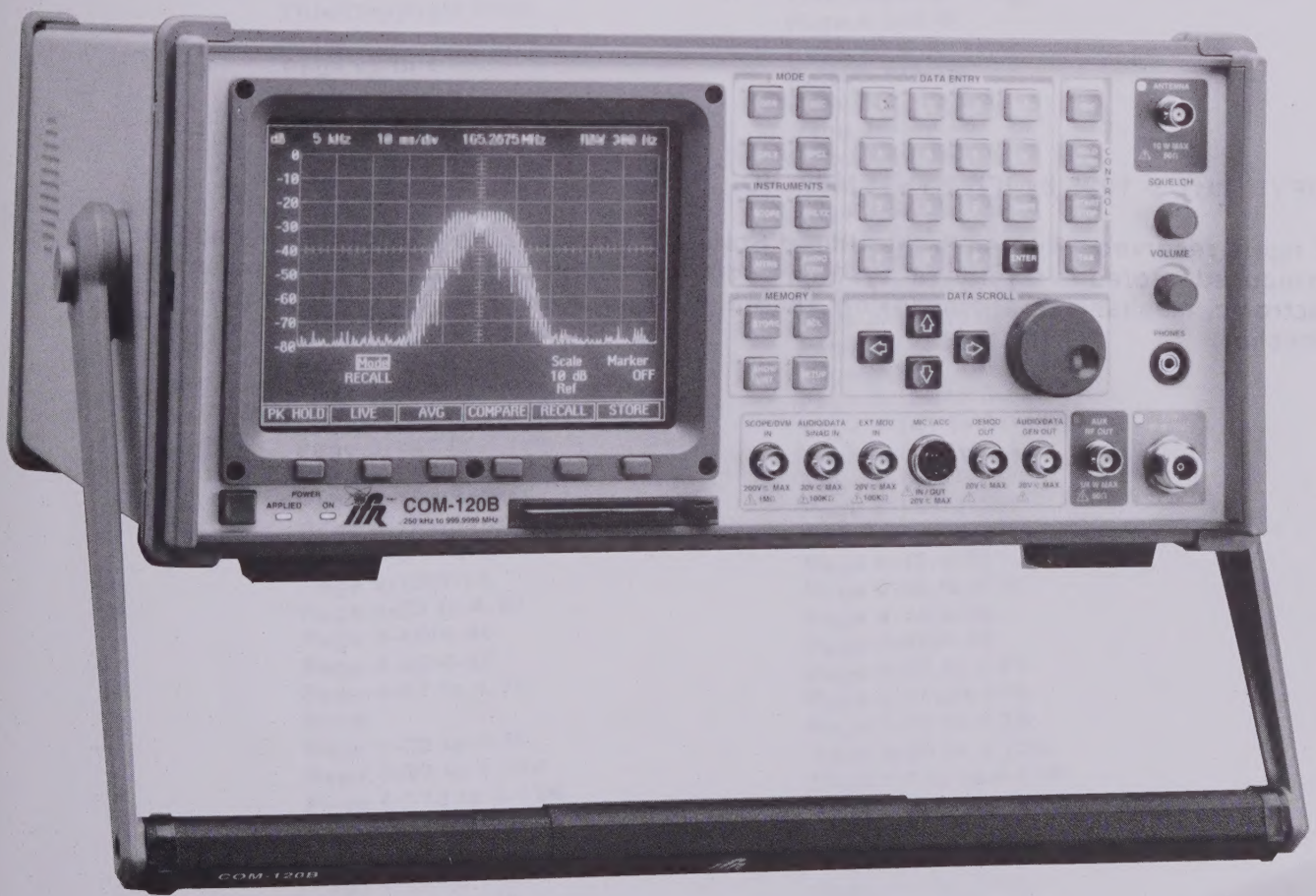
MP MASTER
MA25282

OPERATION MANUAL

SYSTEMS, INC.

COM - 120B

COMMUNICATIONS SERVICE MONITOR



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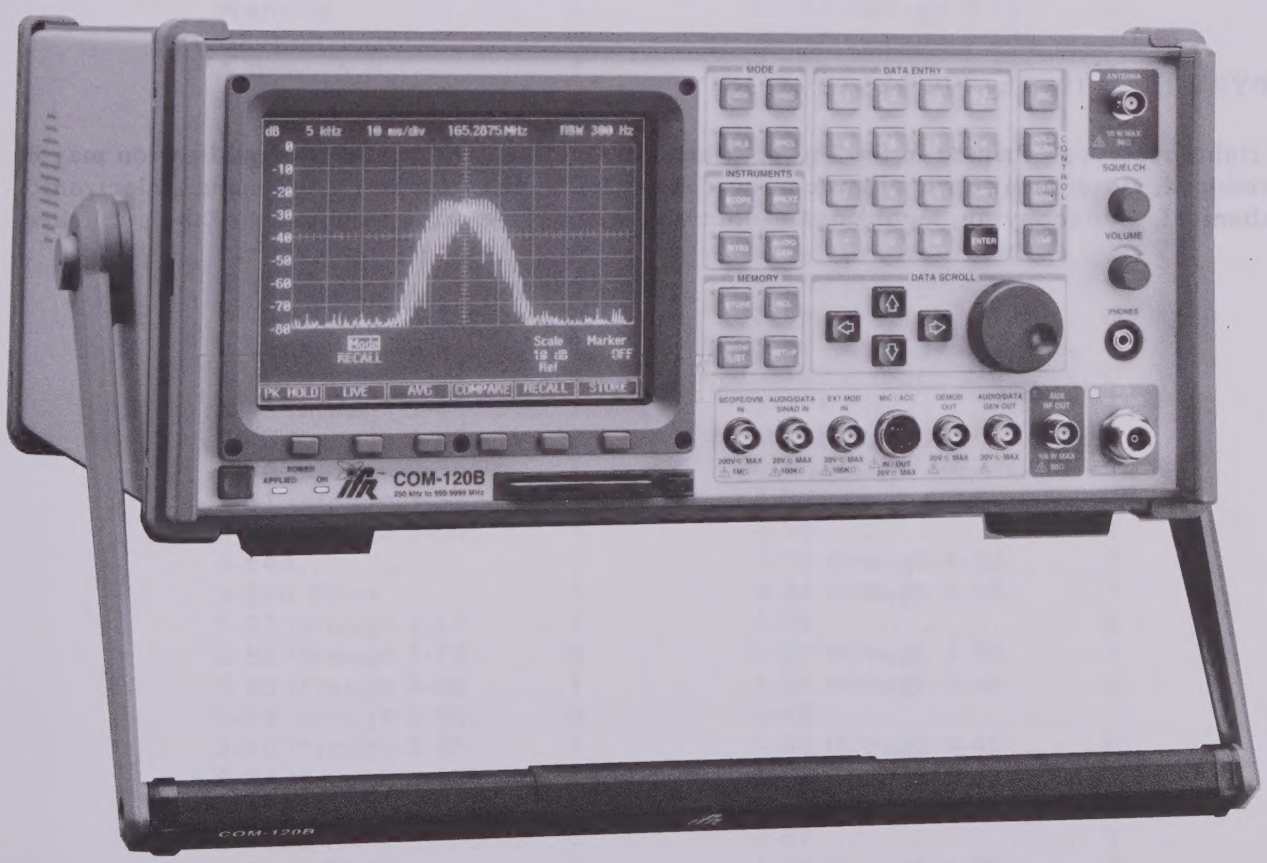

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PUBLISHED BY
IFR SYSTEMS INC.
Wichita, Kansas

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LIST OF EFFECTIVE PAGES

The manual changes listed below which are affected by a current change or revision, are so identified by a revision number.

Date of issue for original and changed pages are:

Original	0	July 31, 1995
Revision	1	October 20, 1995

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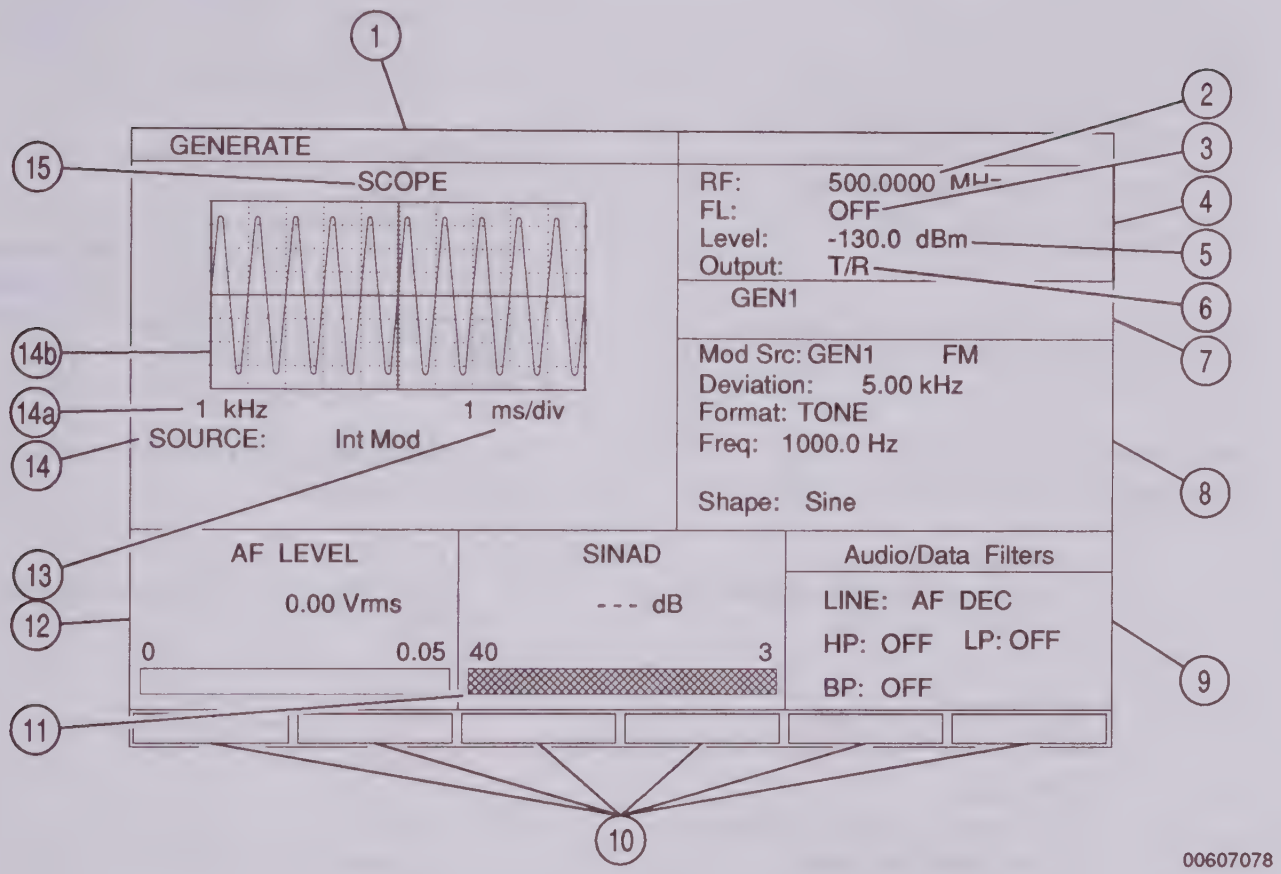
A. RF GENERATE GENERAL OPERATION SCREEN



RF Generator Operation Screen

1. Header Bar

Displays current operation mode.

2. RF Field

Displays current RF Generate Frequency from 0.0000 to 1000.0000 MHz.

Soft Function Keys available with this function include:

F1 Δ=
Accesses window to set RF Field change increment (Δ Freq). With Δ= active, Soft Function Keys are defined as follows:

F6 RETURN
Closes window and returns to normal operation.

F2 Δ On/Off
Toggles Δ Function OFF and ON. If Δ Function is active, "Δ" is displayed by Frequency Readout.

F3 SET REF
Changes frequency in current RF Field to reference frequency. RF Field displays offset from reference frequency when activated. If Set Reference

Function is active, "R" is displayed.

F4 SWEEP
Accesses menu to configure COM-120B RF Generator to sweep specified frequency range. If Sweep Operation is active, Sweep Prompt is displayed.

Set Reference Function and Sweep Function cannot be active simultaneously.

With Sweep Function active, Soft Function Keys are defined as follows:

F1 START
Activates Sweep Function in continuous loop.

F2 STOP
Stops Sweep Function.

F3 SINGLE
Activates Sweep Function for one pass through frequency range.

F5 RESUME
Restarts Sweep Function after STOP Soft Function Key F2 is pressed.

F6 RETURN
Exits Sweep Function into normal RF Generate operation.

F5 LOCK/UNLOCK
Sets frequency used for Receive Operation and Spectrum Analyzer Operation to same frequency as current RF Field. If LOCK Function is active, "L" is displayed and UNLOCK is displayed for F5 definition. Pressing F5, when UNLOCK is displayed, toggles LOCK Function OFF. Editing Frequency in any Operation Screen is reflected in all three Operation Screens when Lock Function is engaged.

3. FL (Frequency List) Setting

Displays selected Frequency List number (FL-00 to FL-99) when active. Blank if inactive. RF Field (3) echoes frequency of selected Frequency List setting. Editing RF Field (3) deactivates Frequency List Function.

Soft Function Keys available with this function include:

F1 On/Off
Toggles active function On and Off.

F2 T-Fwd
Accesses Trunking-Forward Channel List.

F3 T-Rvs
Accesses Trunking-Reverse Channel List.

F4 C-Fwd
Accesses Cellular-Forward Channel List.

F5 C-Rvs
Accesses Cellular-Reverse Channel List.

F6 FL
Accesses User Defined Frequency List.

4. Frequency List Label

Displays optional Frequency List Label. Blank if Frequency List Label is not used.

DTMF/SINAD Low-Pass Filter Field (54) to OFF.

Soft Function Keys available with this function include:

F1 OFF
Deactivates Bandpass Filtering on DTMF/SINAD Line.

F2 C-MSG
Routes DTMF/SINAD Signal through C-Message Weighted Bandpass Filter.

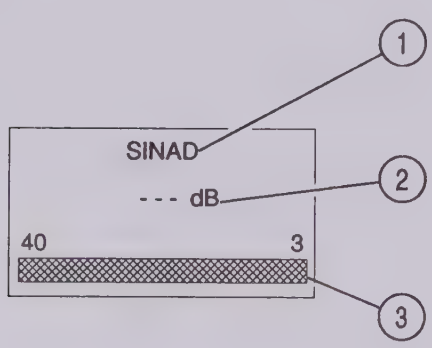
F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to any other operation mode.

F6 RETURN
Returns to RF Generate Operation Screen.

D. SINAD METER

The SINAD Meter for the RF Generate measures SINAD for a 1 kHz tone passed through the AUDIO/DATA IN Connector. Filtering for the signal passed to the SINAD Meter is provided by the Audio/Data Filters.

Information provided from the RF Generate Operation Screen is displayed as follows:



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1. SINAD/Distortion Meter Label

   Displays label for selected Meter Operation. Selections include SINAD and Distortion Meters. Refer to para 3-3-1(E) for description of Distortion Meter.

Soft Function Keys available with this function include:

F1 ZOOM
Expands current meter into full-size meter.

F2 SINAD
Selects SINAD Meter as active meter. Not displayed if meter is currently active.

F3 DIST
Selects Distortion Meter as active meter. Not displayed if meter is currently active.

2. Meter Reading

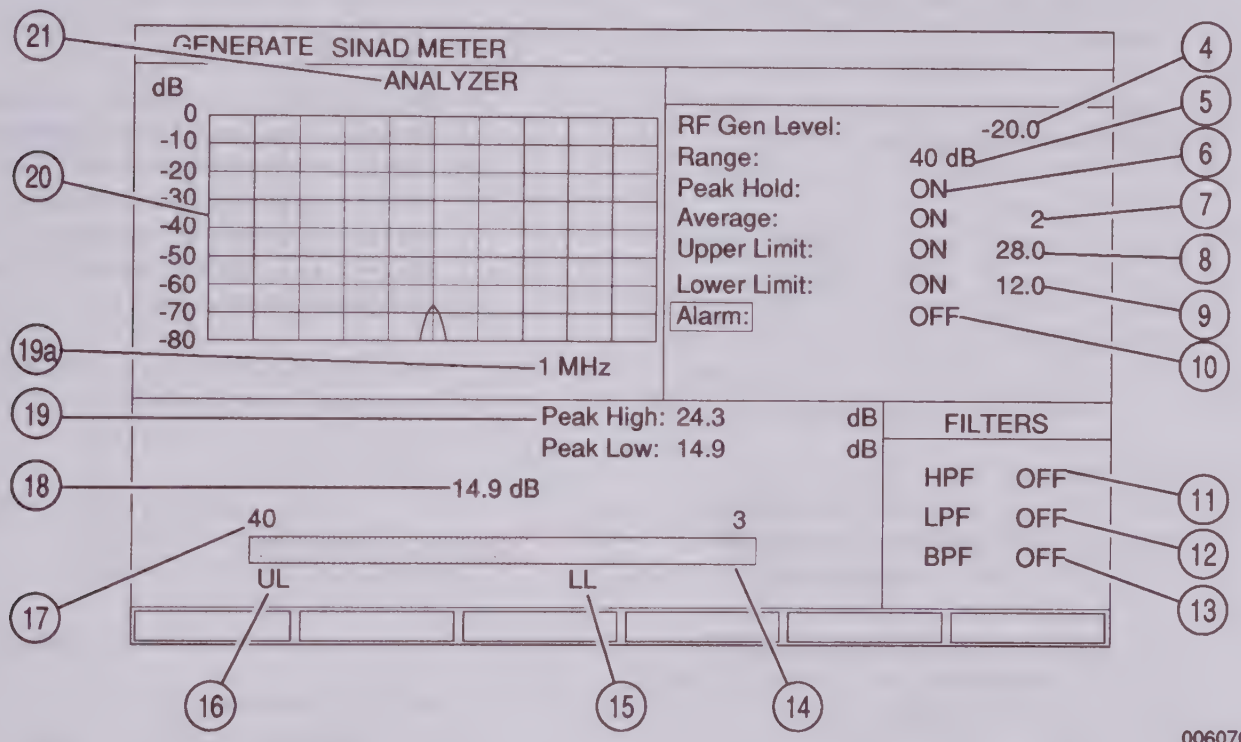
   Displays current SINAD Meter Reading in dB.

3. Meter Bar

   Provides graphic display of current SINAD Meter reading in dB.

Pressing ZOOM Soft Function Key F1 when cursor is at SINAD/Distortion Meter Label (1) accesses full screen SINAD Meter.

Available features and editable fields are listed as follows:



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4. RF Gen Level

Displays Output Level in selected units. If T/R Connector is selected for Output (7), range is -130 to -20 dBm, .07 to 22360.6 µV, 0.0000 to 22.3606 mV and 0.000000 to 0.022360 V. If AUX RF Connector is selected for Output (7), range is -130 to -13 dBm, .07 to 50059.3 µV, 0.0000 to 50.0593 mV and 0.000000 to 0.050059 V.

Soft Function Keys available with this function include:

F1 dBm
Sets Output Level Units to dBm.

F2 uV
Sets Output Level Units to µV.

F3 mV
Sets Output Level Units to mV.

F4 V
Sets Output Level Units to V.

F5 SINAD=
Access field to set SINAD Search Function value.

F5 S=On/Off
Toggles SINAD Search Function On and Off. SINAD Seach Function changes Output Level to search for SINAD= value from UUT. S= Prompt is displayed with function ON.

5. Range

Displays selected SINAD Meter Upper Range. Selections include Autorange, 15 dB and 40 dB.

Soft Function Keys available with this function include:

F1 15 dB
Selects 15 dB as active upper range for SINAD Meter.

F2 40 dB
Selects 40 dB as active upper range for SINAD Meter.

F3 AUTO
Selects Autorange as active upper range for SINAD Meter. This setting automatically adjusts to a higher or lower upper range if signal increases or decreases to a specified level of the current setting.

F5 RST PK
Resets Peak Readings displayed to 0.

F6 RETURN
Returns Test Set to RF Generate Operation Screen.

6. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. When ON, Peak Readings (19) are displayed. Invalid in Autorange.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to RF Generator Operation Screen.

7. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages selected number of readings and reports average as Digital Readout. Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to RF Generator Operation Screen.

8. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0 to 40 dB. When ON, Upper Limit Bar (16) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to RF Generator Operation Screen.

9. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range is 0 to 40 dB. When ON, Lower Limit Bar (15) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to RF Generator Operation Screen.

10. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (8) or is below Lower Limit (9).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to RF Generator Operation Screen.

11. High-Pass Filter (HPF)

Displays current High-Pass Filter setting for SINAD Meter.

12. Low-Pass Filter (LPF)

Displays current Low-Pass Filter setting for SINAD Meter.

13. Bandpass Filter (BPF)

Displays current Bandpass Filter Setting for SINAD Meter.

14. Bar Meter

Relative Graphic display of current SINAD Meter reading.

15. Lower Limit Bar

Indicates position of Lower Limit (9) on Bar Meter (14). If Lower Limit (9) exceeds Range (5), marker is not visible.

16. Upper Limit Bar

Indicates position of Upper Limit (8) on Bar Meter (14). If Upper Limit (8) exceeds Range (5), marker is not visible.

17. Upper Range Limit Readout

Displays current value of Range (4). Redefined as needed if Autorange function is active.

18. Digital Readout

Displays current SINAD Meter Reading.

19. Peak Readings

Displays current high and low Peak Readings when Peak Hold (6) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

19a. Scan Width

Displays current Scan Width. This field is editable. Available Scan Widths include:

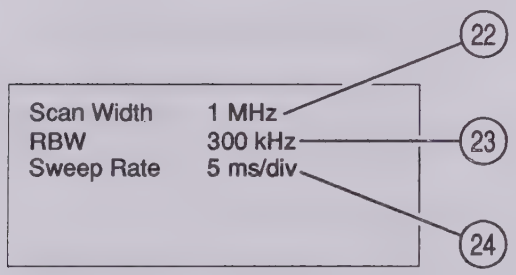
0 kHz	1 kHz	2 kHz
5 kHz	10 kHz	20 kHz
50 kHz	100 kHz	200 kHz
500 kHz	1 MHz	

Soft Function Keys available with this function include:

F1 MENU
Selects a Scan Width pop up menu.

F6 RETURN
Returns to Generate SINAD Meter screen.

F2 CONFIG
Accesses a pop up screen to configure Scan width, RBW (Resolution Bandwidth) and Sweep rate.



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20. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

21. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions.

22. Scan Width

Displays current Analyzer Scan Width. This field is editable. Available Scan Widths include:

0 kHz	1 kHz	2 kHz
5 kHz	10 kHz	20 kHz
50 kHz	100 kHz	200 kHz
500 kHz	1 MHz	

Soft Function Keys available with this function include:

F1 COUPLE
Sets the Sweep and RBW to factory default state for the current scan width.

F6 RETURN
Returns to Generate SINAD Meter screen.

23. RBW (Resolution Bandwidth

Displays current Analyzer Resolution Bandwidth. This field is editable. Available Resolution Bandwidths include:

300 Hz	3 kHz	30 kHz
300 kHz	3 MHz	

Soft Function Keys available with this function include:

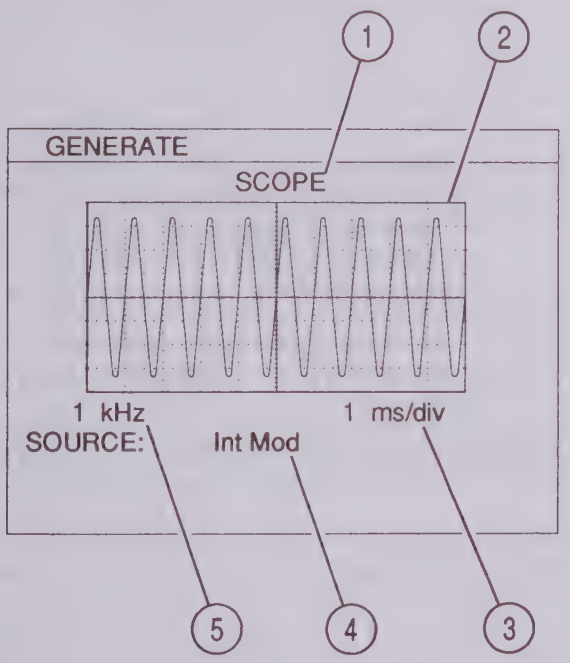
F1 COUPLE
Sets the Sweep and RBW to factory default state for the current scan width.

F2 DEFAULT
Sets only the current field to factory default state for the current scan width.

G. OSCILLOSCOPE OPERATION SCREEN

The abbreviated Oscilloscope, as follows below, is visible from the RF Generate Operation Screen and the following operation screens:

SINAD Meter Operation Screen
Distortion Meter Operation Screen
Audio Frequency Level Meter Operation Screen.



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1. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions.

Soft Function Keys are available on RF Generate Operation Screen only:

F1 ZOOM
Accesses expanded version of active function.

F2 ANALY/SCOPE
Accesses inactive function. If SCOPE is active, displays ANALY. If ANALYZER is active, displays SCOPE.

2. Oscilloscope Screen

Displays digitized trace of specified signal.

3. Sweep

Displays selected Oscilloscope Sweep Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Scale. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into Generate Operation Screen.

F2 ROLL
Views the scope trace in a roll mode when the selected sweep rate is 100 ms/Div or higher.

F2 SLOW
Returns to the normal mode of operation.

4. SCOPE SOURCE

Displays selected Oscilloscope Source. Selections include:

Source	Signal Input	Signal Type
Scope/DVM-GND	SCOPE/DVM Connector	External GND-Coupled Signal
Scope/DVM-AC	SCOPE/DVM Connector	External AC-Coupled Signal
Scope/DVM-DC	SCOPE/DVM Connector	External DC-Coupled Signal
Ext Mod	EXT MOD IN Connector	External Modulation
Notch Residual	Internal Filtered Signal	Notch Filtered Signal passed to SINAD and Distortion Meters. Reading is relative with no units applied.
Audio/Data In	AUDIO/DATA IN Connector	External Audio or Data Signal
Int Mod	Internal Modulation	Composite Modulation Signal generated by Internal Audio/Data Generators

Soft Function Keys available with this function include:

F1 MENU
Accesses MENU to set active Oscilloscope Source. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into Generate Operation Screen without changing Source.

5. Oscilloscope Scale

Displays selected Oscilloscope Vertical Scale. Selections available differ with different SCOPE SOURCE (4). Scales for each SCOPE SOURCE (4) are as follows:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
Ext Mod	100, 200, 500 mV/Div 1, 2, 5 V/Div
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data In	100, 200, 500 mV/Div 1, 2, 5 V/Div
Int Mod GEN1 FM >25 kHz:	 1, 2, 5, 10, 20, 50 kHz/Div
GEN1 FM 2.5 to 12.75 kHz:	1, 2, 5, 10, 20, 50 kHz/Div

8. Marker Position

Displays current Marker Position if Marker (14) is active or OFF if inactive. Value for Marker Position is in same units as Sweep (6) with Trigger point as reference.

Soft Function Keys available with this function include:

F1 ON/OFF
Toggles Marker (14) between ON and OFF.

9. Trigger Type

Displays current Trigger Type. Selections include Auto, One Shot and Normalized.

Soft Function Keys available with this function include:

F1 NORM
Selects Normalized Trigger Type.

F2 AUTO
Selects Auto as Trigger Type.

F3 1 SHOT
Selects and enables One Shot as Trigger Type.

10. Trigger

Adjusts trigger level as indicated by Trigger Level Indicator (15) when accessed.

11. Mode

Displays selected Operation Mode. Selections include Menu, Average, Pk Hold, Min Hold and Store. Menu displays a menu window with selections Live, Recall, Compare, Live-Ref and Ref-Live. Live displays current signal without modification. Recall displays Stored trace only. Compare displays Stored trace and live trace simultaneously. In Live-Ref, the value of each point of the reference trace is subtracted from the current reading and the result is displayed. In Ref-Live, the value of current reading is subtracted from the stored value and the result is displayed. Both Live-Ref and Ref-Live require a previously stored trace. Average displays average of last four traces. Pk Hold displays and holds the trace peak. Min Hold displays and holds minimum trace. Store places copy of current trace in memory.

Soft Function Keys available with this function include:

F1 MENU
Accesses a Menu with Mode selections.

F1 LIVE
Selects LIVE as Oscilloscope Operation Mode.

F2 RECALL
Selects RECALL as Oscilloscope Operation Mode.

F3 COMPARE
Selects COMPARE as Oscilloscope Operation Mode.

F4 LIVE-REF
Selects LIVE-REF as Oscilloscope Operation Mode.

F5 REF-LIVE
Selects REF-LIVE as Oscilloscope Operation Mode.

F6 RETURN
Exits Menu into Generate Operation Screen.

F2 AVG
Activates/deactivates Average Oscilloscope Operation Mode.

F3 PK HOLD
Activates/deactivates Peak Hold Oscilloscope Operation Mode.

F4 MIN HOLD
Activates/deactivates Minimum Hold Oscilloscope Operation Mode.

F6 STORE
Stores the current trace.

12. H Pos

Displays selected horizontal offset in major divisions. Selections range from -10 to +10 Divisions.

13. V Pos

Accesses vertical position of trace.

14. Marker

User editable Marker controlled using Marker Position (8). Movable through extent of visible screen.

15. Trigger Level Indicator

Indicates level of Oscilloscope Trigger Level. Editable using Trigger (10).

16. Oscilloscope Scale

Displays selected Oscilloscope Vertical Scale. Selections available differ with different Source as set in RF Generate Operation Screen. Scales are as follows:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
Ext Mod	100, 200, 500 mV/Div 1, 2, 5 V/Div
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data In	100, 200, 500 mV/Div 1, 2, 5 V/Div
Int Mod GEN1 FM >25 kHz:	1, 2, 5, 10, 20, 50 kHz/Div
GEN1 FM 2.5 to 12.75 kHz:	1, 2, 5, 10, 20, 50 kHz/Div
GEN1 FM 12.75 to 25 kHz:	.2, .4, 1, 2, 4, 10 kHz/Div
GEN1 FM <2.5 kHz:	.2, .4, 1, 2, 4, 10 kHz/Div
GEN1 PM <2.55 RAD:	.2, .4, 1, 4, 10 kHz/Div
GEN1 PM >2.55 RAD:	1, 2, 5, 10, 20,50 RAD/Div
GEN1 AM:	all settings 20%

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Scale. Soft Function Keys available with this function include:

F1 Set Ref
Adjusts Spectrum Analyzer to an internal reference level at current frequency. Function must be initiated at each new frequency to achieve maximum accuracy.

6. Marker Position

Displays current Marker Position if Marker (12) is active or OFF if inactive. Value for Marker Position is MHz.

Soft Function Keys available with this function include:

F1 ON/OFF
Toggles Marker (12) between ON and OFF.

7. Marker Level

Displays current Marker Level if Marker (12) is active. Displays Blank if Marker (12) is OFF.

8. Scale

Displays selected Logarithmic Scale for Spectrum Analyzer Vertical Scale (11). Selections are 2 and 10 dB.

F1 10 dB
Selects 10 dB Logarithmic Scale for Spectrum Analyzer Vertical Scale (11).

F2 2 dB
Selects 2 dB Logarithmic Scale for Spectrum Analyzer Vertical Scale (11).

9. Reference

Adjusts Spectrum Analyzer Vertical Scale (11) ±10 dB when Scale (8) is set to 10 dB. When Scale (8) is set to 2 dB, adjusts Spectrum Analyzer Vertical Scale (11) through full range, displaying 16 dB window and incrementing in 1 dB steps.

10. Mode

Displays selected Operation Mode. Selections include Menu, Average, Peak Hold, Minimum Hold and Store. Menu displays a menu window with selections Live, Recall, Compare, Live-Ref and Ref-Live. Live displays current signal without modification. Recall displays Stored trace only. Compare displays Stored trace and live trace simultaneously. In Live-Ref, the value of each point of the reference trace is subtracted from the current reading and the result is displayed. In Ref-Live, the value of current reading is subtracted from the stored value and the result is displayed. Both Live-Ref and Ref-Live require a previously stored trace. Average displays average of last four traces. Pk Hold displays and holds the trace peak. Min Hold displays and holds minimum trace. Store places copy of current trace in memory.

Soft Function Keys available with this function include:

F1 MENU
Accesses a Menu with Mode selections.

F1 LIVE
Selects LIVE as Spectrum Analyzer Operation Mode.

F2 RECALL
Selects RECALL as Spectrum Analyzer Operation Mode.

F3 COMPARE
Selects COMPARE as Analyzer Spectrum Operation Mode.

F4 LIVE-REF
Selects LIVE-REF as Spectrum Analyzer Operation Mode.

F5 REF-LIVE
Selects REF-LIVE as Spectrum Analyzer Operation Mode.

F6 RETURN
Exits Menu into Generate Operation Screen.

F2 AVG
Activates/deactivates Average Spectrum Analyzer Operation Mode.

F3 PK HOLD
Activates/deactivates Peak Hold Spectrum Analyzer Operation Mode.

F4 MIN HOLD
Activates/deactivates Minimum Hold Spectrum Analyzer Operation Mode.

F6 STORE
Selects STORE as Spectrum Analyzer Operation Mode.

11. Vertical Scale

Provides logarithmic scale for Spectrum Analyzer. Position is controlled by Reference (9).

12. Marker

User editable Marker controlled using Marker Position (6).

13. Zero Scan Sweep

Displays selected Sweep per division. Selections include:

200 µs/div	500 µs/div	1 ms/div
2 ms/div	5 ms/div	10 ms/div
20 ms/div	50 ms/div	100 ms/div
200 ms/div	500 ms/div	

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Scan Width. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into Generate Analyzer Screen.

F5 DEFLT
Sets only the current field to factory default.

F6 COUPLE
Sets the sweep and RBW to factory default state for the current scan width.

14. Scan Width

Displays selected Scan Width per division. Selections include zero scan and:

1 kHz	2 kHz	5 kHz
10 kHz	20 kHz	50 kHz
100 kHz	200 kHz	500 kHz
1 MHz	2 MHz	5 MHz
10 MHz	20 MHz	50 MHz
100 MHz		

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Scan Width. Soft Function Keys available with this function include:

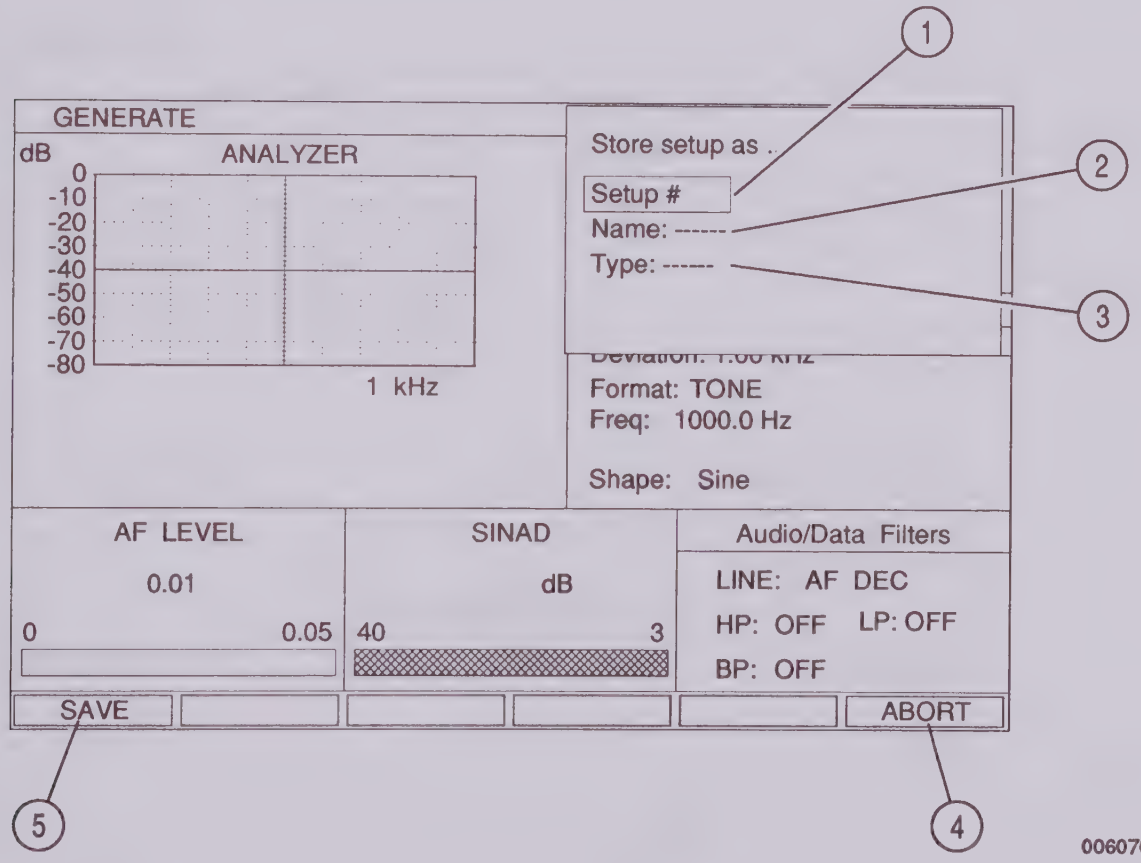
F6 RETURN
Exits Menu into Generate Analyzer Screen.

F6 COUPLE
Sets the sweep and RBW to factory default state for the current scan width.

I. STORE AND RECALL OPERATION

Pressing STORE Memory Key allows the operator to store up to 50 RF Generate Operation Screen configurations. Storage Locations 0 through 49 can be used to store an RF Generate Operation configuration, RF Receive Operation configuration or Duplex Operation configuration (Receive and Generate pair).

Pressing STORE Memory Key when in RF Generate Operation Screen accesses the following fields:



00607081

1. Setup #

Displays selected Memory Location for storage of current configuration.

2. Name

Displays optional alphanumeric label for selected Memory Location.

3. Type

Displays the type of data currently saved in the specified setup number. Available types to save and recall are: DUPLEX, GENERATOR, RECEIVER, GENERATOR & RECEIVER and EMPTY.

4. ABORT Soft Function Key F6

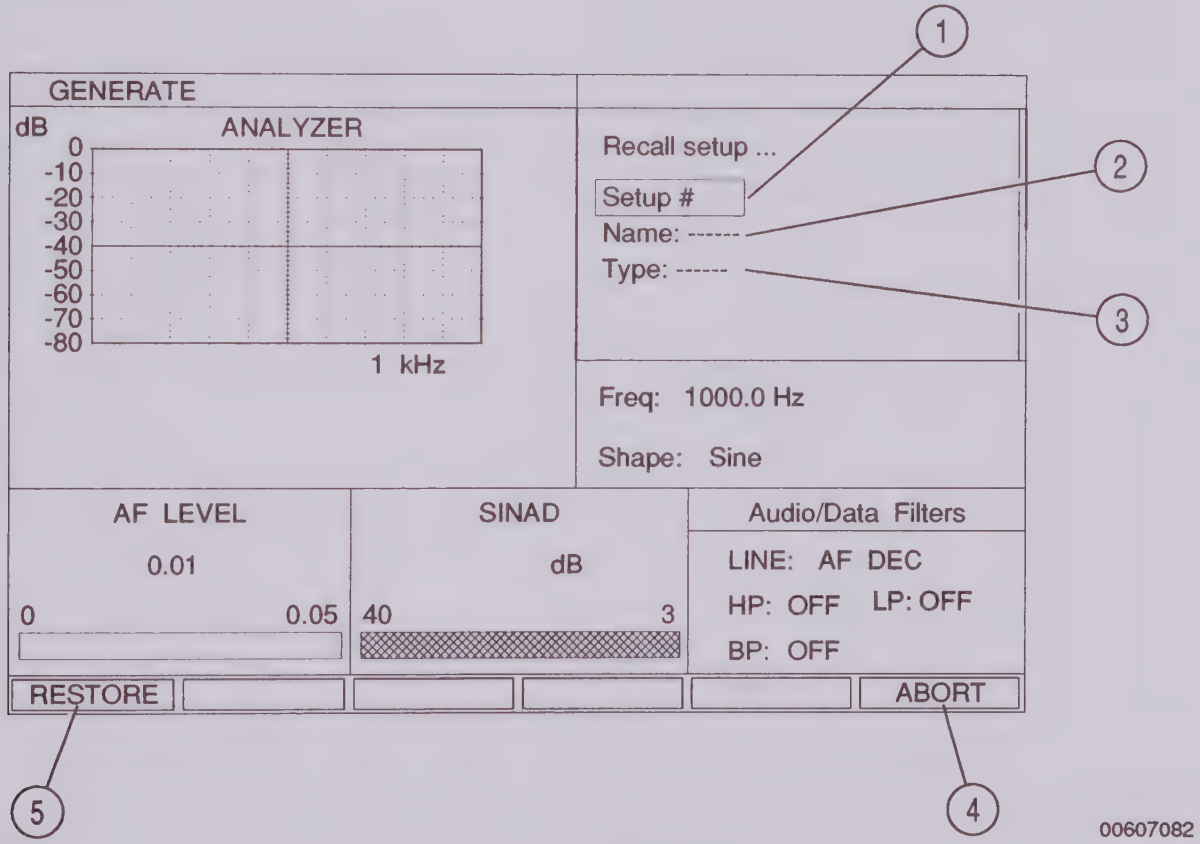
Escapes Storage Operation without performing edit. SAVE Soft Function Key F1 (5) or ABORT Soft Function Key F6 must be pressed to return to normal operation.

5. SAVE Soft Function Key F1

Finalizes Storage Operation. SAVE Soft Function Key F1 or ABORT Soft Function Key F6 (4) must be pressed to return to normal operation.

Pressing RCL Memory Key allows the operator to recall up to 50 previously stored operation screens. RF Receive, RF Generate or Duplex Operation Screen configurations can all be accessed from the RF Generate Operation Screen. Accessing anything other than an RF Generate Operation Screen configuration, automatically switches the COM-120B to the selected mode of operation.

Pressing RCL Memory Key when in RF Generate Operation Screen accesses the following fields:



00607082

1. Setup #

   Displays selected Memory Location for recall of stored configuration.

2. Name

   Displays optional alphanumeric label for selected Memory Location.

3. Type

   Displays the type of data saved in the specified setup number. Available types to save and recall are: DUPLEX, GENERATOR, RECEIVER, GENERATOR & RECEIVER and EMPTY.

4. ABORT Soft Function Key F6

Escapes Storage Operation without performing edit. RESTORE Soft Function Key F1 (5) or ABORT Soft Function Key F6 must be pressed to return to normal operation.

5. RESTORE Soft Function Key F1

Finalizes Recall Operation. RESTORE Soft Function Key F1 or ABORT Soft Function Key F6 (4) must be pressed to return to normal operation.

50. FORMAT

Displays selected Signalling Format for decoding. Selections are limited to USER for standard configuration. Additional selections are shown, but are unusable unless Option 09 or Option 11 is installed. Additional selections available include:

TONE	CCIRH
TONE REMOTE	CCIRH4
USER	NATEL
EEA	EURO
EIA	5/6 TONE
ZVEI	10 PS
DZVEI	20 PS
DDZVEI	MTS
CCIR	

Soft Function Keys available with this function include:

F1 MENU
Displays Menu of Signalling Format selections.

F2 DECODE
Activates Decode Function. Field is highlighted when Decode Function is active.

F3 PG UP
Pages screen up to view decoded information.

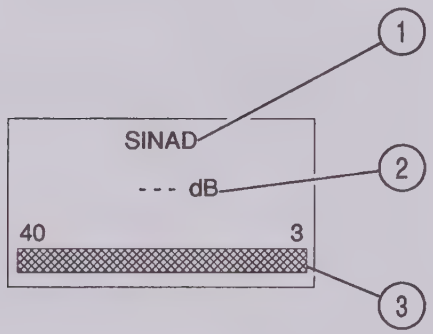
F4 PG DN
Pages screen down to view decoded information.

F6 RETURN
Returns to RF Receive Operation Screen.

D. SINAD METER

The RF Receive Operation Screen SINAD Meter measures SINAD for a 1 kHz tone modulation for an RF signal passed to the RF Receiver. The RF signal is demodulated and filtered before being passed to the SINAD Meter. Filtering for the signal passed to the SINAD Meter is provided by the Audio/Data Filters.

The SINAD Meter can be shown as reading in dB only or as a meter. Information provided from the RF Receive Operation Screen is displayed as follows:



00607079

1. SINAD/Distortion/Modulation Meter Label

   Displays label for selected Meter Operation. Selections include SINAD, Distortion and Modulation Meters.

Soft Function Keys available with this function include:

F1 ZOOM
Expands current meter into full-size meter.

F2 SINAD
Selects SINAD Meter as active meter. Not displayed if meter is active.

F3 DIST
Selects Distortion Meter as active meter. Not displayed if meter is active.

F4 DEV
Selects Modulation Meter associated with Demodulation type as active meter. Not displayed if meter is active.

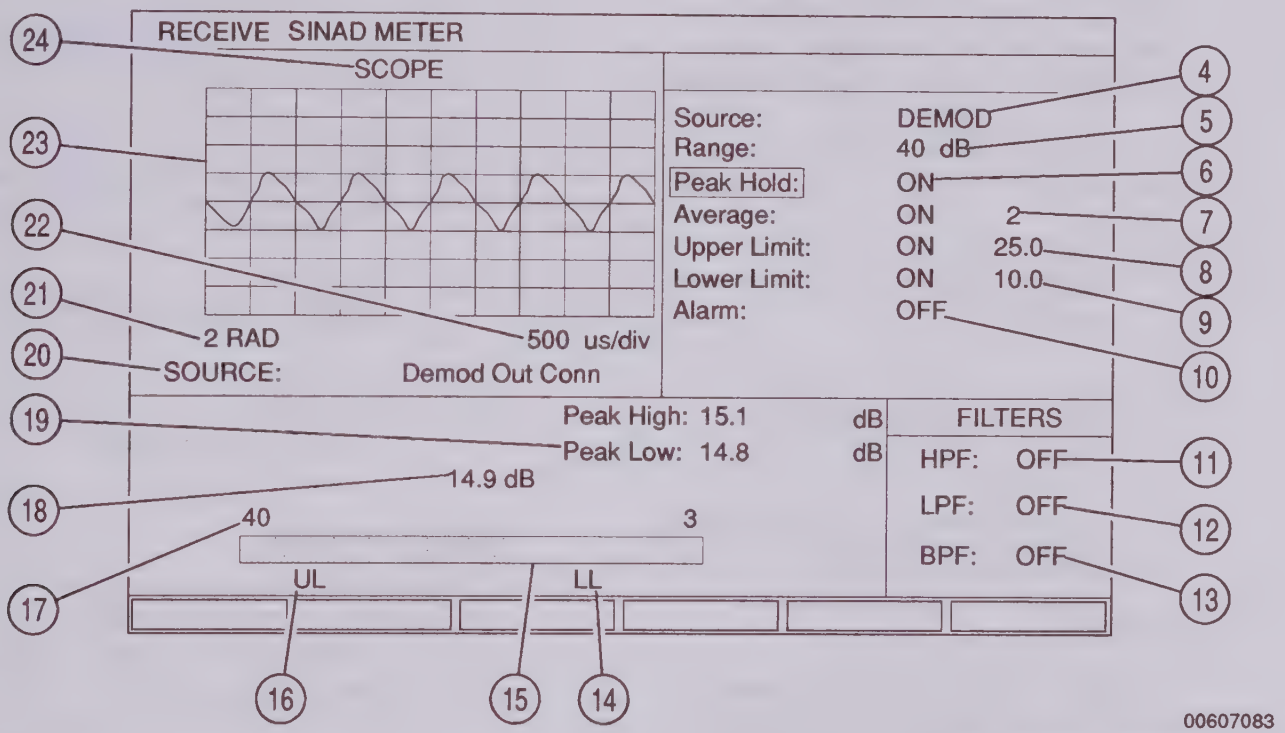
2. Meter Reading

   Displays current SINAD Meter Reading in dB.

3. Meter Bar

   Provides graphical display of current SINAD Meter reading in dB.

Pressing ZOOM Soft Function Key F1 when cursor is at SINAD/Distortion/Modulation Meter Label (1) accesses full screen SINAD Meter. Available features and editable fields are as follows:



00607083

4. Source

Displays DEMOD, indicating signal source for SINAD measurement is demodulated signal. Field is for display only.

5. Range

Displays selected SINAD Meter Upper Range. Selections include Autorange, 15 dB and 40 dB.

Soft Function Keys available with this function include:

F1 15 dB
Selects 15 dB as active upper range for SINAD Meter.

F2 40 dB
Selects 40 dB as active upper range for SINAD Meter.

F3 AUTO
Selects Autorange as active upper range for SINAD Meter. This setting automatically adjusts to a higher or lower upper range if signal increases or decreases to a specified level of the current setting.

F5 RST PK
Resets Peak Readings displayed to 0.

F6 RETURN
Returns Test Set to normal RF Receive Operation Screen.

6. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. Remains OFF in Autorange. When ON, Peak Readings (19) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

7. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages a selected number of readings and reports average as Digital Readout (18). Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

8. Upper Limit

Displays current status of upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0 to 40 dB. When ON, Upper Limit Bar (16) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

9. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range is 0 to 40 dB. When ON, Lower Limit Bar (14) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

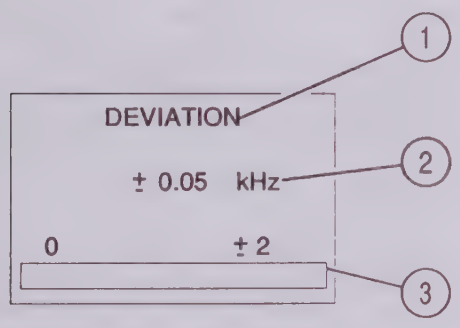
10. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, alarm sounds when signal exceeds Upper Limit (8) or is below Lower Limit (9).

F. FM DEVIATION METER

The FM Deviation Meter for the RF Receive Operation Screen measures FM Deviation for an RF signal passed to the RF Receiver. The RF signal is demodulated and filtered before being passed to the FM Deviation Meter. Filtering for the signal passed to the FM Deviation Meter is provided by the Audio/Data Filters.

The FM Deviation Meter can be shown as reading in kHz only or as a meter. Information provided from the RF Receive Operation Screen is displayed as follows:



00607074

1. SINAD/Distortion/Modulation Meter Label

   Displays label for selected Meter Operation. Selections include SINAD, Distortion and Modulation Meters.

Soft Function Keys available with this function include:

F1 ZOOM
Expands current meter into full-size meter.

F2 SINAD
Selects SINAD Meter as active meter. Not displayed if meter is active.

F3 DIST
Selects Distortion Meter as active meter. Not displayed if meter is active.

F4 DEV
Selects Modulation Meter associated with Demodulation type as active meter. Not displayed if meter is active.

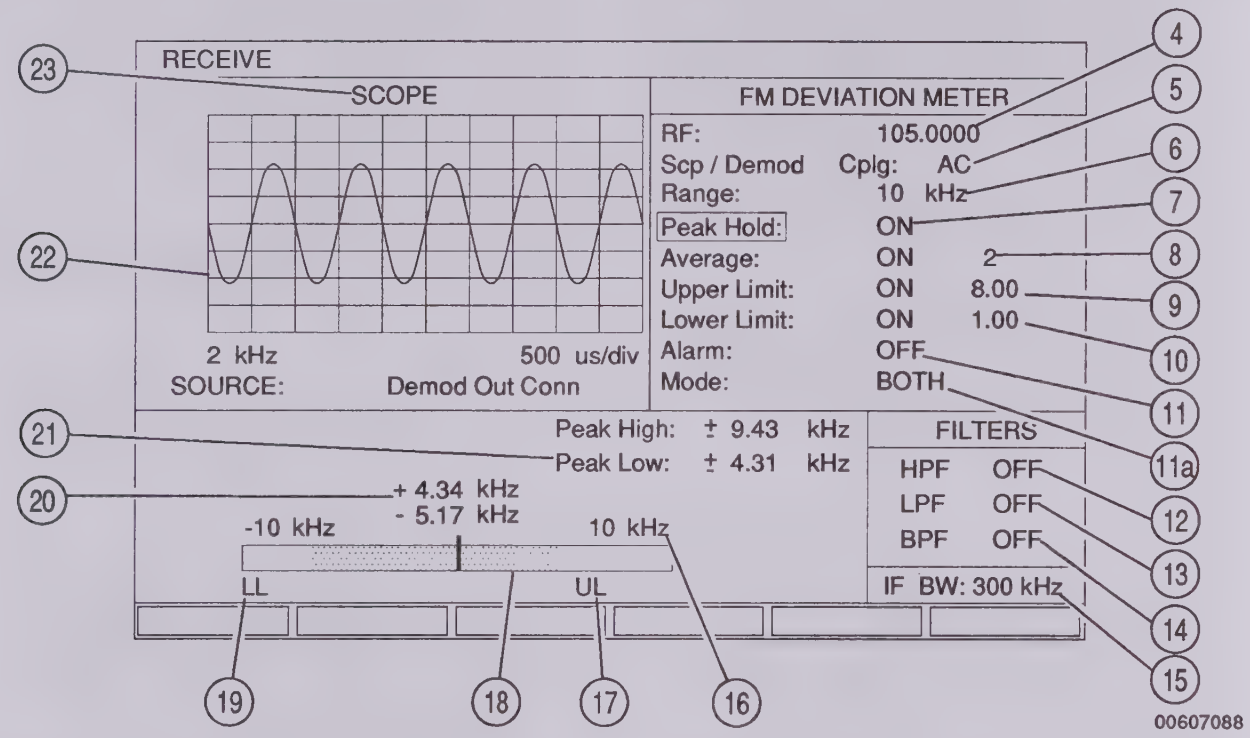
2. Meter Reading

   Displays current FM Deviation Meter Reading in kHz.

3. Meter Bar

   Provides graphical display of current FM Deviation Meter reading in kHz.

Pressing ZOOM Soft Function Key F1 when cursor is at SINAD/Distortion/Modulation Meter Label (1) accesses full screen FM Deviation Meter. Available features and editable fields are as follows:



4. RF

Displays selected RF Receiver Frequency. Selections range from .000 to 1000 MHz.

5. Scope/DEMOD Connector Coupling

Displays selected coupling for Oscilloscope and DEMOD Connector. Selections are AC or DC.

Soft Function Keys available with this function include:

F1 AC
Selects AC Coupling for Oscilloscope and DEMOD Connector.

F2 DC
Selects DC Coupling for Oscilloscope and DEMOD Connector.

F5 FM-Z
Automatically calibrates FM Zero.

F6 RETURN
Returns unit to RF Receive Operation Screen.

6. Range

Displays selected FM Deviation Meter Upper Range. Selections include Autorange and the following:

2 kHz	5 kHz	10 kHz
20 kHz	50 kHz	100 kHz

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Scale.

F2 AUTO
Selects Autorange for Deviation Meter Range.

F5 RST PK
Resets Peak Deviation Meter readings.

F6 RETURN
Returns unit to RF Receive Operation Screen.

7. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. Remains OFF in Autorange. When ON, Peak Readings (21) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

8. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages selected number of readings and reports average as Digital Readout (20). Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

9. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0 to 99.99 kHz. When ON, Upper Limit Bar (17) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

10. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range is 0 to 99.99 kHz. When ON, Lower Limit Bar (19) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

11. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (9) or is below Lower Limit (10).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

11a. Mode

Toggles the Deviation Meter between the standard mode (+/- div by 2) and peak mode (+ and - peak deviation as two seperate readings/bars).

Soft Function Keys available with this function include:

F1 NORM
Selects Normal for +/- peak div by 2.

F2 BOTH
Selects + and - peak deviation. The upper limit applies to the largest peak Positive reading and the lower limit applies to the largest Negative reading. For Peak Hold readings, Peak Hi applies to the largest Positive peak reading found and Pead Lo applies to the largest Negative reading found.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

12. High-Pass Filter (HPF)

Displays current High-Pass Filter setting for FM Deviation Meter.

13. Low-Pass Filter(LPF)

Displays current Low-Pass Filter setting for FM Deviation Meter.

14. Bandpass Filter (BPF)

Displays current Bandpass Filter setting for FM Deviation Meter.

15. IF Bandwidth

Displays selected IF Bandwidth. Selections include 15 and 300 kHz.

Soft Function Keys available with this function include:

F1 300 kHz
Selects 300 kHz bandpass filter as active filter.

F2 15 kHz
Selects 15 kHz bandpass filter as active filter.

16. Upper Range Limit Readout

Displays current value of Range (6). Redefined as needed if Autorange function is active.

17. Upper Limit Bar

Indicates position of Upper Limit (9) on Bar Meter (18). If Upper Limit (9) exceeds Range (6), marker is not visible.

18. Bar Meter

Relative Graphic display of current FM Deviation Meter reading. Displays NORM (+/- div by 2) or BOTH (+ and - peak deviation).

19. Lower Limit Bar

Indicates position of Lower Limit (10) on Bar Meter (18). If Lower Limit (10) exceeds Range (6), marker is not visible.

20. Digital Readout

Displays current FM Deviation Meter Reading.

21. Peak Readings

Displays current high and low Peak readings when Peak Hold (7) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

22. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

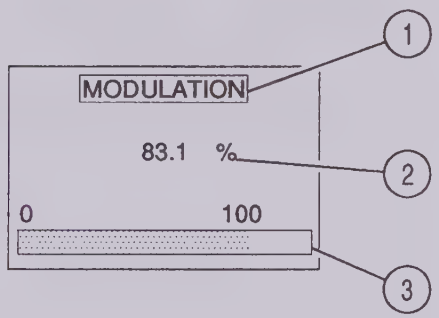
23. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions.

G. AM MODULATION METER

The AM Modulation Meter for the RF Receive Operation Screen measures AM Modulation for an RF signal passed to the RF Receiver. The RF signal is demodulated and filtered before being passed to the AM Modulation Meter. Filtering for the signal passed to the AM Modulation Meter is provided by the Audio/Data Filters.

The AM Modulation Meter can be shown as reading in % only or as a meter. Information provided from the RF Receive Operation Screen is displayed as follows:



8717058

1. SINAD/Distortion/Modulation Meter Label

   Displays label for selected Meter Operation. Selections include SINAD, Distortion and Modulation Meters.

   Soft Function Keys available with this function include:

   F1 ZOOM
   Expands current meter into full-size meter.

   F2 SINAD
   Selects SINAD Meter as active meter. Not displayed if meter is currently active.

   F3 DIST
   Selects Distortion Meter as active meter. Not displayed if meter is currently active.

   F4 DEV
   Selects Modulation Meter associated with Demodulation type as active meter. Not displayed if meter is currently active.

2. Meter Reading

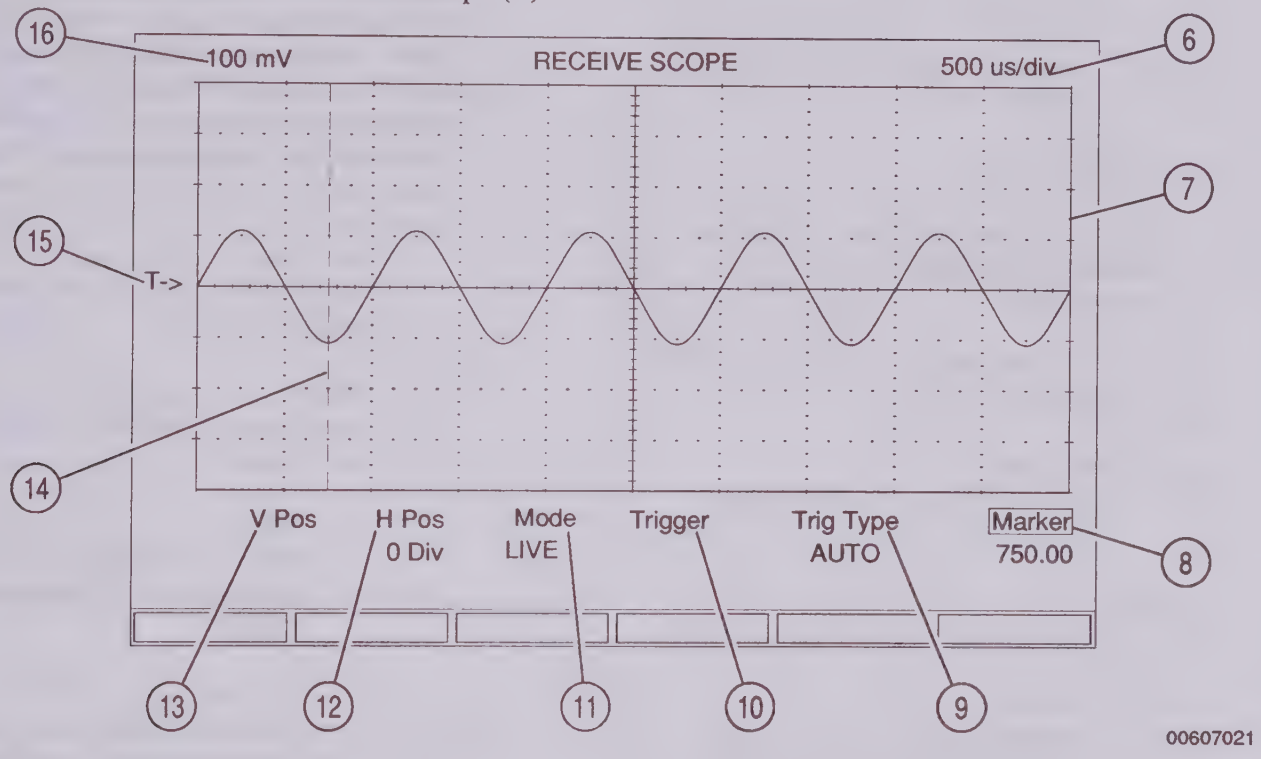
   Displays current AM Modulation Meter Reading in % Modulation.

3. Meter Bar

   Provides graphical display of current AM Modulation Meter reading in % Modulation.

Pressing ZOOM Soft Function Key F1 accesses full screen Oscilloscope, when cursor is on SCOPE/ANALYZER Prompt (1).

Available features and parameters are as follows:



6. Sweep

Displays selected Oscilloscope Sweep. Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Sweep.

F6 RETURN
Exits Menu into normal operation.

F2 ROLL
Views the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.

F2 SLOW
Returns to the normal mode of operation.

7. Oscilloscope Screen

Displays digitized trace of specified signal.

8. Marker Position

Displays Marker Position if Marker (14) is active or OFF if inactive. Value for Marker Position is in same units as Sweep (6) with Trigger Level (15) as reference.

Soft Function Keys available with this function include:

F1 On/Off
Toggles Marker (14) between On and Off

9. Trigger Type

Displays Trigger Type. Selections include Auto, One Shot and Normalized.

Soft Function Keys available with this function include:

F1 NORM
Selects Normalized Trigger Type.

F2 AUTO
Selects Auto as Trigger Type.

F3 1 SHOT
Selects One Shot as Trigger Type. Pressing 1 Shot Soft Function Key reenables Trigger.

10. Trigger

Adjusts trigger level as indicated by Trigger Level Indicator (15) when accessed.

11. Mode

Displays selected Operation Mode. Selections include Menu, Average, Pk Hold, Min Hold and Store. Menu displays a menu window with selections Live, Recall, Compare, Live-Ref and Ref-Live. Live displays current signal without modification. Recall displays Stored trace only. Compare displays Stored trace and live trace simultaneously. In Live-Ref, the value of each point of the reference trace is subtracted from the current reading and the result is displayed. In Ref-Live, the value of current reading is subtracted from the stored value and the result is displayed. Both Live-Ref and Ref-Live require a previously stored trace. Average displays average of last four traces. Pk Hold displays and holds the trace peak. Min Hold displays and holds minimum trace. Store places copy of current trace in memory.

Soft Function Keys available with this function include:

F1 MENU
Accesses a Menu with Mode selections.

F1 LIVE
Selects LIVE as Oscilloscope Operation Mode.

F2 RECALL
Selects RECALL as Oscilloscope Operation Mode.

F3 COMPARE
Selects COMPARE as Oscilloscope Operation Mode.

F4 LIVE-REF
Selects LIVE-REF as Oscilloscope Operation Mode.

F5 REF-LIVE
Selects REF-LIVE as Oscilloscope Operation Mode.

F6 RETURN
Exits Menu into Generate Operation Screen.

F2 AVG
Activates/deactivates Average Oscilloscope Operation Mode.

F3 PK HOLD
Activates/deactivates Peak Hold Oscilloscope Operation Mode.

F4 MIN HOLD
Activates/deactivates Minimum Hold Oscilloscope Operation Mode.

F6 STORE
Stores the current trace.

12. H Pos

Displays selected horizontal offset in major divisions. Selections range from -10 to +10 Divisions.

13. V Pos

Accesses vertical position of trace.

14. Marker

User editable Marker controlled using Marker Position (8). Movable through extent of visible screen.

15. Trigger Level Indicator

Indicates approximate Oscilloscope Trigger Level. Editable using Trigger (10).

16. Oscilloscope Scale

Displays Oscilloscope Vertical Scale. Selections available differ with different Source. Scales for each SCOPE SOURCE (4) are as follows:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
AF Cntr	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data/Gen Out	20, 40, 100, 200, 400 mV 1 V
DTMF/SINAD	FM DEMOD TYPES: ≤20 kHz 0.1, 0.2, 0.5, 1, 2, 5 kHz ≥20 kHz 0.2, 0.4, 1, 2, 4, 10 kHz 50 kHz 0.5, 1, 2.5, 5, 10, 25 kHz 100 kHz 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE: 20% PM DEMOD TYPE Radians 0.1, 0.2, 0.5, 1, 2, 5
Data Decoder	FM DEMOD TYPES: ≤20 kHz 0.1, 0.2, 0.5, 1, 2, 5 kHz ≥20 kHz 0.2, 0.4, 1, 2, 4, 10 kHz 50 kHz 0.5, 1, 2.5, 5, 10, 25 kHz 100 kHz 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE: 20% PM DEMOD TYPE Radians 0.1, 0.2, 0.5, 1, 2, 5
RF Power	Low, Med, High (Selection is automatic depending on power provided T/R Connector)
Detector Out	FM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians

SCOPE SOURCE (4)	Available Scales
Demod Out Connector	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Mod Meters	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Scale. Soft Function Keys available with this function include:

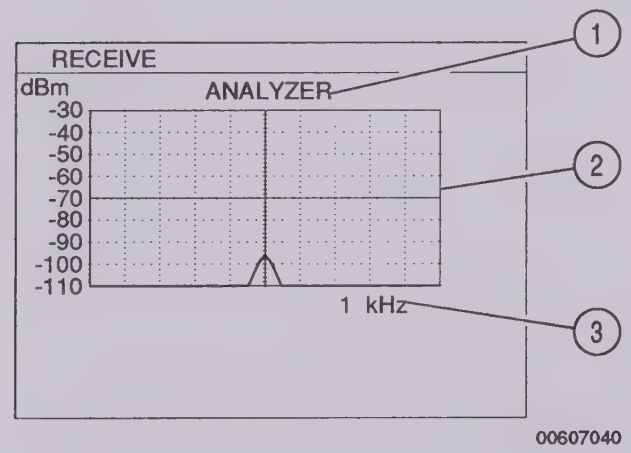
F6 RETURN
Exits Menu to RF Receive Operation Screen.

N. SPECTRUM ANALYZER OPERATION SCREEN

The abbreviated Spectrum Analyzer, as follows, is visible from the RF Receive Operation Screen and the following full-size Meter Operation Screens:

SINAD Meter
Distortion Meter
FM Deviation Meter
AM Modulation Meter
Phase Modulation Meter
RF Power Meter
Receive Level Meter
RF Frequency Error Meter
Audio Frequency Counter

An abbreviated Oscilloscope is available in the same position. All set parameters are reflected in all of the above Operation Screens. Features and parameters of the abbreviated Spectrum Analyzer are as shown:



1. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions.

Soft Function Keys available with this field include:

F1 ZOOM
Accesses expanded version of active function.

F2 ANALY/SCOPE
Accesses inactive function. If SCOPE is active, displays ANALY. If ANALYZER is active, displays SCOPE.

2. Spectrum Analyzer Screen

Displays digitized trace of specified signal.

3. Scan Width

Displays selected Scan Width per division. Selections include zero scan and:

1 kHz	50 kHz	2 kHz
100 kHz	5 kHz	200 kHz
10 kHz	500 kHz	20 kHz
1 MHz		

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Scan Width. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into normal operation.

F2 CONFIG
Accesses a pop up screen to configure Scan width, RBW

Soft Function Keys available with this function include:

F1 T/R
Selects T/R Connector as RF Input Connector.

F2 ANT
Selects ANTENNA Connector as RF Input Connector.

11. Atten

Displays Attenuation for RF Input (10). Selections include 0 dB and 30 dB.

Soft Function Keys available with this function include:

F1 30 dB
Selects 30 dB Attenuation for RF Input (10).

F2 0 dB
Selects 0 dB Attenuation for RF Input (10).

12. Mode

Displays selected Operation Mode. Selections include Menu, Average, Peak Hold, Minimum Hold and Store. Menu displays a menu window with selections Live, Recall, Compare, Live-Ref and Ref-Live. Live displays current signal without modification. Recall displays Stored trace only. Compare displays Stored trace and live trace simultaneously. In Live-Ref, the value of each point of the reference trace is subtracted from the current reading and the result is displayed. In Ref-Live, the value of current reading is subtracted from the stored value and the result is displayed. Both Live-Ref and Ref-Live require a previously stored trace. Average displays average of last four traces. Pk Hold displays and holds the trace peak. Min Hold displays and holds minimum trace. Store places copy of current trace in memory.

Soft Function Keys available with this function include:

F1 MENU
Accesses a Menu with Mode selections.

F1 LIVE
Selects LIVE as Spectrum Analyzer Operation Mode.

F2 RECALL
Selects RECALL as Spectrum Analyzer Operation Mode.

F3 COMPARE
Selects COMPARE as Analyzer Spectrum Operation Mode.

F4 LIVE-REF
Selects LIVE-REF as Spectrum Analyzer Operation Mode.

F5 REF-LIVE
Selects REF-LIVE as Spectrum Analyzer Operation Mode.

F6 RETURN
Exits Menu into Generate Operation Screen.

F2 AVG
Activates/deactivates Average Spectrum Analyzer Operation Mode.

F3 PK HOLD
Activates/deactivates Peak Hold Spectrum Analyzer Operation Mode.

F4 MIN HOLD
Activates/deactivates Minimum Hold Spectrum Analyzer Operation Mode.

F6 STORE
Stores the current trace.

13. Vertical Scale

Provides scale for Spectrum Analyzer. Position is controlled by Reference (9).

14. Marker

User editable Marker controlled using Marker Position (8).

15. Zero Scan Sweep

Displays selected Sweep per division when Scan Width (16) is set to Zero Scan. Selections include:

200 µs/div	500 µs/div	1 ms/div
2 ms/div	5 ms/div	10 ms/div
20 ms/div	50 ms/div	100 ms/div
200 ms/div	500 ms/div	

16. Scan Width

Displays selected Scan Width per division. Selections include zero scan and:

1 kHz	50 kHz	2 kHz
100 kHz	5 kHz	200 kHz
10 kHz	500 kHz	20 kHz
1 MHz	2 MHz	5 MHz
10 MHz	20 MHz	50 MHz
100 MHz		

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Scan Width. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into normal operation.

F6 COUPLE
Sets the sweep and RBW to factory default state for the current scan width.

17. Logarithmic Function

Displays selected Logarithmic Function for referencing Vertical Scale (13). Selections include dBm, dBµV, dBmV, dBV, dBµW and dBW.

Soft Function Keys available with this function include:

F1 dBm
Selects dBm as Logarithmic Function.

F2 dBµV
Selects dBµV as Logarithmic Function.

F3 dBmV
Selects dBmV as Logarithmic Function.

F4 dBV
Selects dBV as Logarithmic Function.

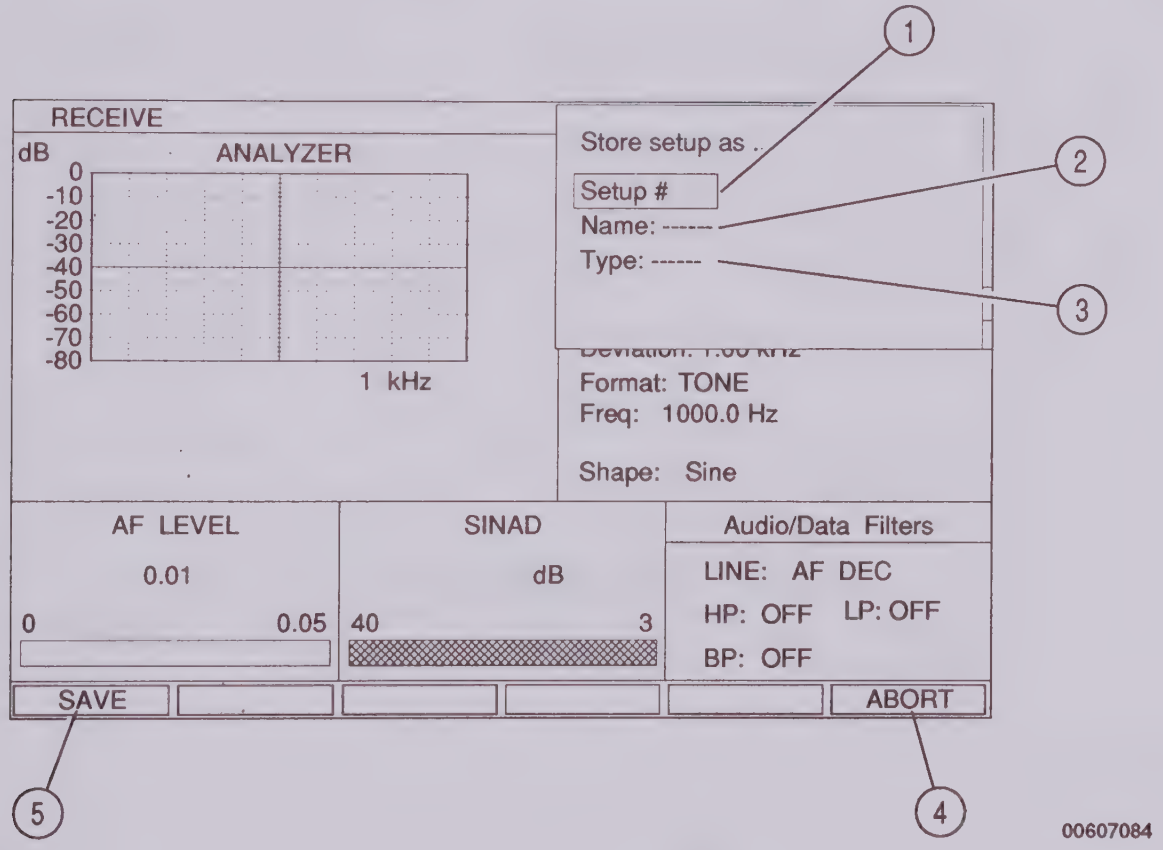
F3 dBµW
Selects dBµW as Logarithmic Function.

F4 dBW
Selects dBW as Logarithmic Function.

O. STORE AND RECALL OPERATION

Pressing STORE Memory Key allows the operator to store up to 50 RF Receive Operation Screen configurations. Storage Locations 0 through 49 can be used to store a RF Generate Operation configuration, a RF Receive Operation configuration or a Duplex Operation configuration (Receive and Generate pair).

Pressing STORE Memory Key while in RF Receive Operation Screen accesses the following fields:



1. Setup #

Displays selected Memory Location for storage of current configuration.

2. Name

Displays optional alphanumeric label for selected Memory Location.

3. Type

Displays the type of data saved in the specified setup number. Available types to save and recall are: DUPLEX, GENERATOR, RECEIVER, GENERATOR & RECEIVER and EMPTY.

4. ABORT Soft Function Key F6

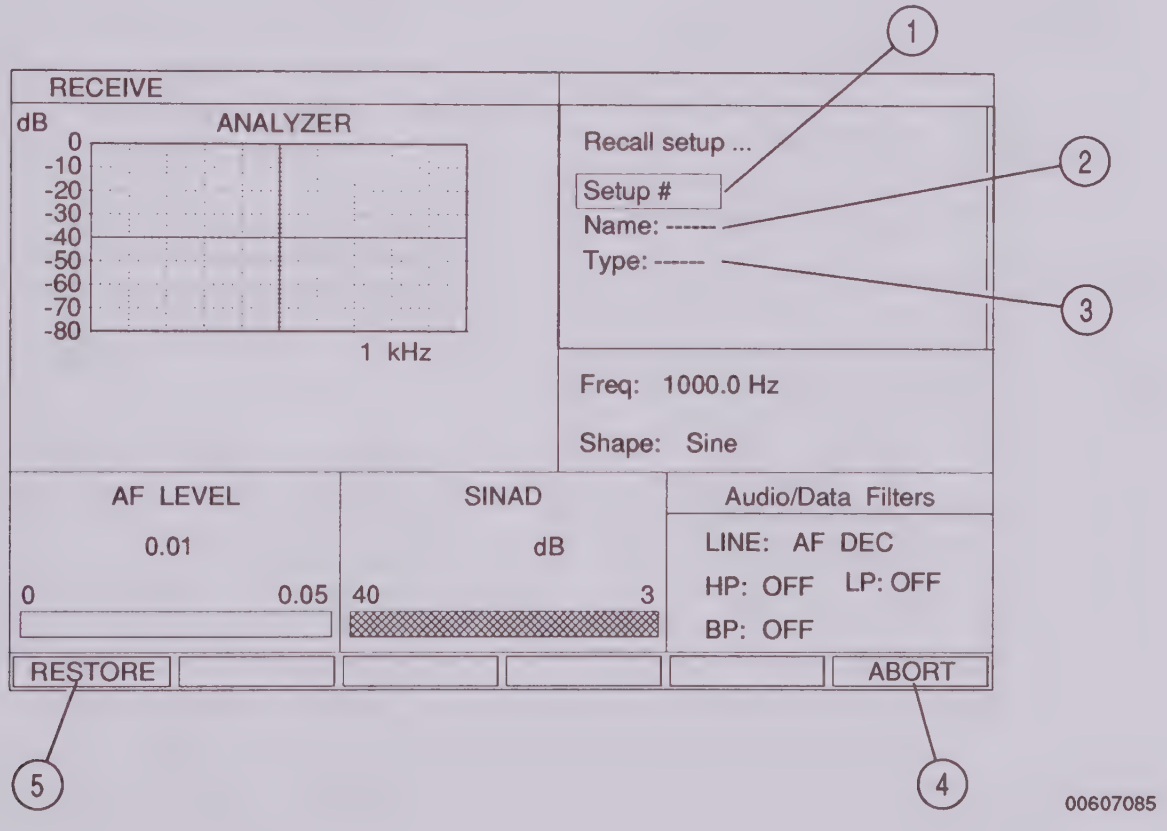
Escapes Storage Operation without performing edit. SAVE Soft Function Key F1 (5) or ABORT Soft Function Key F6 must be pressed to return to normal operation.

5. SAVE Soft Function Key F1

Finalizes Storage Operation. SAVE Soft Function Key F1 or ABORT Soft Function Key F6 (4) must be pressed to return to normal operation.

Pressing RCL Memory Key allows the operator to recall up to 50 previously stored operation screens. RF Receive, RF Generate or Dupex Operation Screen configurations and all be accessed from the RF Generate Operation Screen. Accessing anything other than an RF Generate Operation Screen configuration, automatically switches the COM-120B to the selected mode of operation.

Pressing RCL Memory Key while in RF Receive Operation Screen accesses the following fields:



1. Setup #

   Displays selected Memory Location for recall of stored configuration.

2. Name

   Displays optional alphanumeric label for selected}emory Location.

3. Type

   Displays the type of data saved in the specified setup number. Available types to save and recall are: DUPLEX, GENERATOR, RECEIVER, GENERATOR & RECEIVER and EMPTY.

4. ABORT Soft Function Key F6

Escapes Storage Operation without performing edit. RESTORE Soft Function Key F1 (5) or ABORT Soft Function Key F6 must be pressed to return to normal operation.

5. RESTORE Soft Function Key F1

Finalizes Recall Operation. RESTORE Soft Function Key F1 or ABORT Soft Function Key F6 (4) must be pressed to return to normal operation.

Soft Function Keys available with this function include:

F1 Δ=
Accesses window to set Duplex Receive RF Field change increment. With Δ= active, Soft Function Keys are defined as follows:

F6 RETURN
Closes window and returns to normal operation.

F2 Δ On/Off
Toggles Δ Function OFF and ON. If Δ Function is active,"Δ" is displayed by Frequency Readout.

F5 PAIR/UNPAIR
Toggles PAIR Function ON and OFF. With function active, UNPAIR is displayed. Function Ties Duplex Generate RF Field (3) and Duplex Receive RF Field together as a Pair with specified Frequency Offset (4). With Pair Function active, editing Duplex Generate RF Field (3) changes Duplex Receive RF Field . Editing Frequency Offset (4) or Duplex Receive RF Field changes Duplex Generate RF Field (3).

21. Attenuation

Displays selected attenuation of input signal. Displays either 0 or 30.

Soft Function Keys available with this function include:

F1 30 dB
Selects 30 dB Attenuation.

F2 0 dB
Selects 0 dB Attenuation.

22. Duplex Receive Prompt

Accesses Duplex Receive Operation Screen.

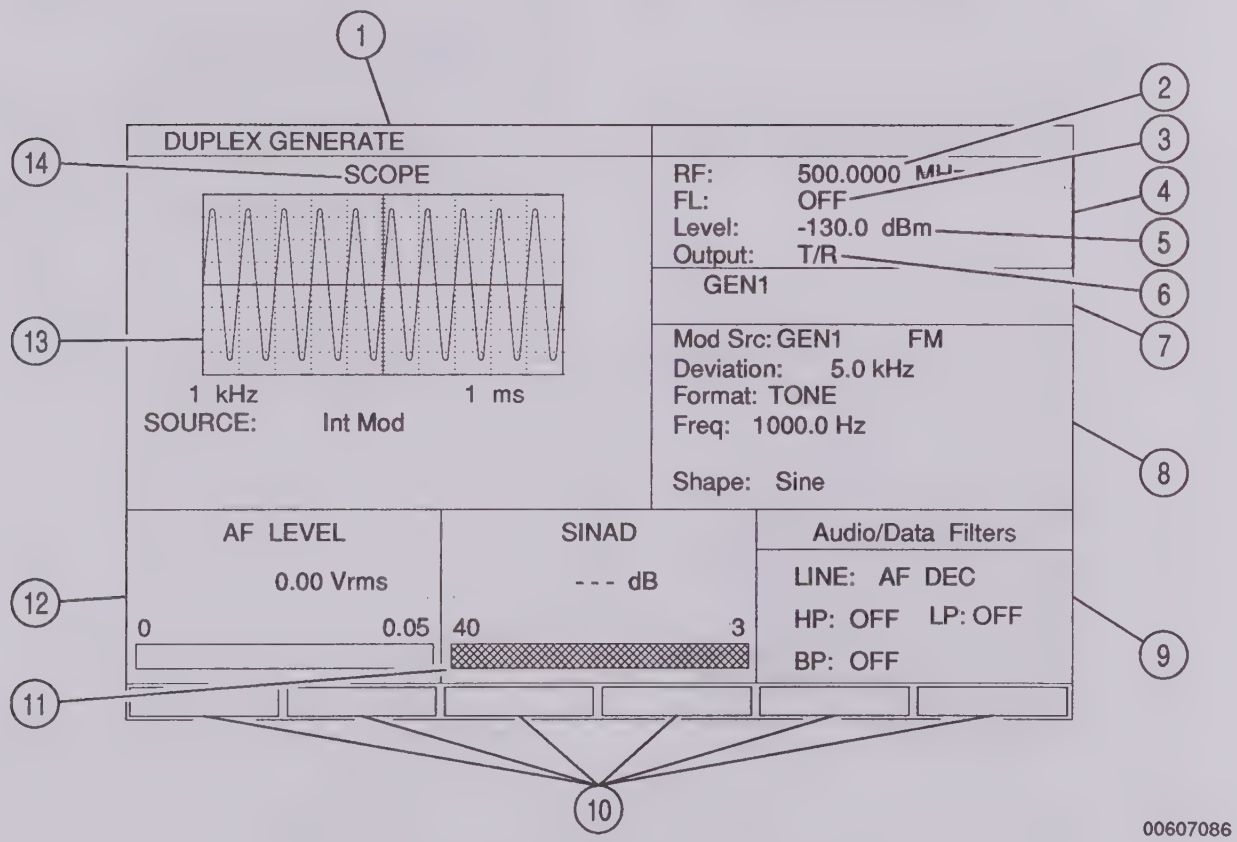
Soft Function Keys available with this function include:

F1 ZOOM
Accesses Duplex Receive Operation Screen.

B. DUPLEX GENERATE GENERAL OPERATION SCREEN

The Duplex Generate Operation Screen is used to define and activate the COM-120B RF Generator for Duplex Operation. The Duplex Generate Operation Screen is accessed by pressing ZOOM Soft Function Key F1 or by pressing ENTER Key while cursor is on the Duplex Generate Prompt on the Duplex Operation Screen.

Features and editable parameters on the Duplex Generate Operation Screen are listed as follows:



Duplex Generate Operation Screen

1. Header Bar

Displays current operation mode.

2. RF Field

Displays current Duplex Generate Frequency from 0.0000 to 1000.0000 MHz.

Soft Function Keys available with this function include:

F1 Δ=
Accesses window to set Duplex Generate RF Field change increment. With Δ= active, Soft Function Keys are defined as follows:

F6 RETURN
Closes window and returns to normal operation.

F2 Δ On/Off
Toggles Δ Function OFF and ON. If Δ Function is active,"Δ" is displayed by Frequency Readout.

F3 SET REF
Makes frequency in current Duplex Generate RF Field reference frequency. Duplex Generate RF Field displays offset from reference frequency when activated. If Set Reference Function is active, "R" is displayed.

F5 PAIR/UNPAIR
Toggles PAIR Function ON and OFF. With function active, UNPAIR is displayed for Soft Function Key field and "P" is displayed next to RF Field. Function ties Duplex Generate RF Field and Duplex Receive Frequency together as Pair with specified Frequency Offset. With Pair Function active, editing Duplex Generate RF Field changes Duplex Receive Frequency.

3. FL (Frequency List) Setting

Displays selected Frequency List number (FL-00 to FL-99) when active. Blank if inactive. RF Field (2) echoes frequency of selected Frequency List setting. Editing RF Field (2) deactivates Frequency List Function.

Soft Function Keys available with this function include:

F1 ON/OFF
Toggles active function ON and OFF.

F2 T-Fwd
Accesses Trunking-Forward Channel List.

F3 T-Rvs
Accesses Trunking-Reverse Channel List.

F4 C-Fwd
Accesses Cellular-Forward Channel List.

F5 C-Rvs
Accesses Cellular-Reverse Channel List.

F6 FL
Accesses User Defined Frequency List.

4. Frequency List Label

Displays optional Frequency List Label if used. Displays Blank if unused.

5. Output Level

Displays Output Level. If T/R Connector is selected for Output (6), range is -130 to -40 dBm, 0 to .002236 V, 0 to 2.2360 mV or 0.07 to 2236.0 µV. If AUX RF Connector is selected for Output (6), range is -130 to -13 dBm, 0 to 0.050059 V, 0 to 50.0593 mV or 0.07 to 50059.3 µV.

Soft Function Keys available with this function include:

F1 dBm
Selects units of dBm for Output Level.

F2 µV
Selects units of µV for Output Level.

F3 mV
Selects units of mV for Output Level.

F4 V
Selects units of V for Output Level.

F5 SINAD=
Access field to set SINAD Search Function value.

F6 S=On/Off
Toggles SINAD Search Function ON and OFF. SINAD Search Function changes Output Level to search for SINAD= value from UUT. S= Prompt is displayed with function ON.

6. Output

Displays Output Connector. Displays T/R, T/R Gate, AUX or AUX Gate. Gated Output is active only when microphone attached to MIC/ACC Connector is keyed.

Soft Function Keys available with this function include:

F1 T/R
Selects T/R Connector as output connector.

F2 AUX
Selects AUX RF OUT Connector as output connector.

F3 T/R Gate
Selects T/R Connector as output connector. Output is only active when microphone, attached to MIC/ACC Connector, is keyed.

F4 AUX Gate
Selects AUX RF OUT Connector as output connector. Output is only active when microphone, attached to MIC/ACC Connector, is keyed.

7. Modulation Source Window

Displays active Modulation Sources. Inactive Modulation Sources are not shown. If two (or more) sections of the RF Modulator are set in conflict (e.g. GEN1 set for PM and GEN2 set for FM, or GEN1 set for 0.01 kHz deviation and GEN2 set for 2.60 kHz deviation) the screen displays the invalid source grayed out.

8. Modulation Source Block

Displays Modulation Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator), DATA (DATA Generator), EXT (External Modulation) and MIC (Microphone Modulation).

9. AUDIO/DATA FILTERS Block

Displays current filter information for selected analog signal. Selections include AF Decode Line, Data Decode Line and Speaker/Headphones Line.

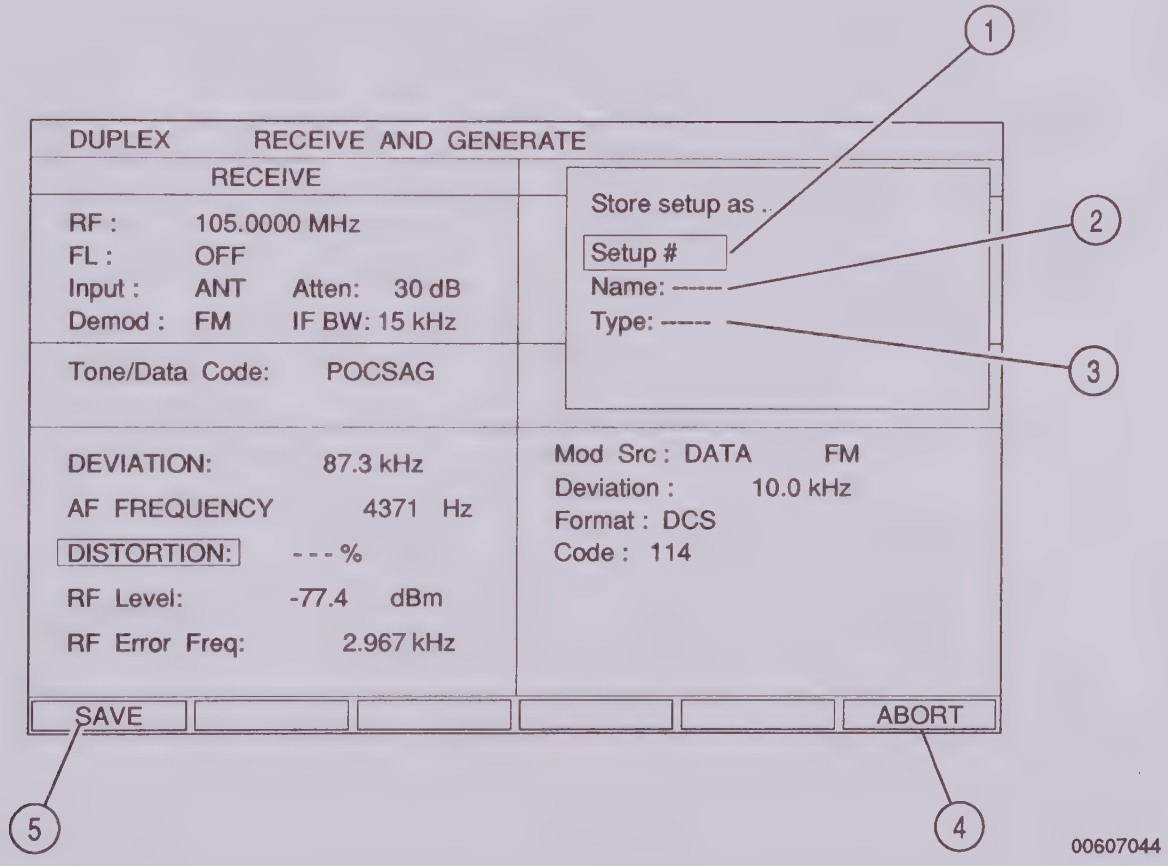
10. Soft Function Key Definitions

Functions are redefined with each field of the current operation screen.

D. STORE AND RECALL OPERATION

Pressing STORE Memory Key allows the operator to store up to 50 Duplex Operation Screen configurations. Storage Locations 0 through 49 can be used to store an RF Generate Operation configuration, RF Receive Operation configuration or Duplex Operation configuration (Receive and Generate pair).

Pressing STORE Memory Key when in Duplex Operation Screen accesses the following fields:



1. Setup #

Displays selected Memory Location for storage of current configuration.

2. Name

Displays optional alphanumeric label for selected Memory Location.

3. Type

Displays the type of data currently saved in the specified setup number. Available types to save and recall are: DUPLEX, GENERATOR, RECEIVER, GENERATOR & RECEIVER and EMPTY.

4. ABORT Soft Function Key F6

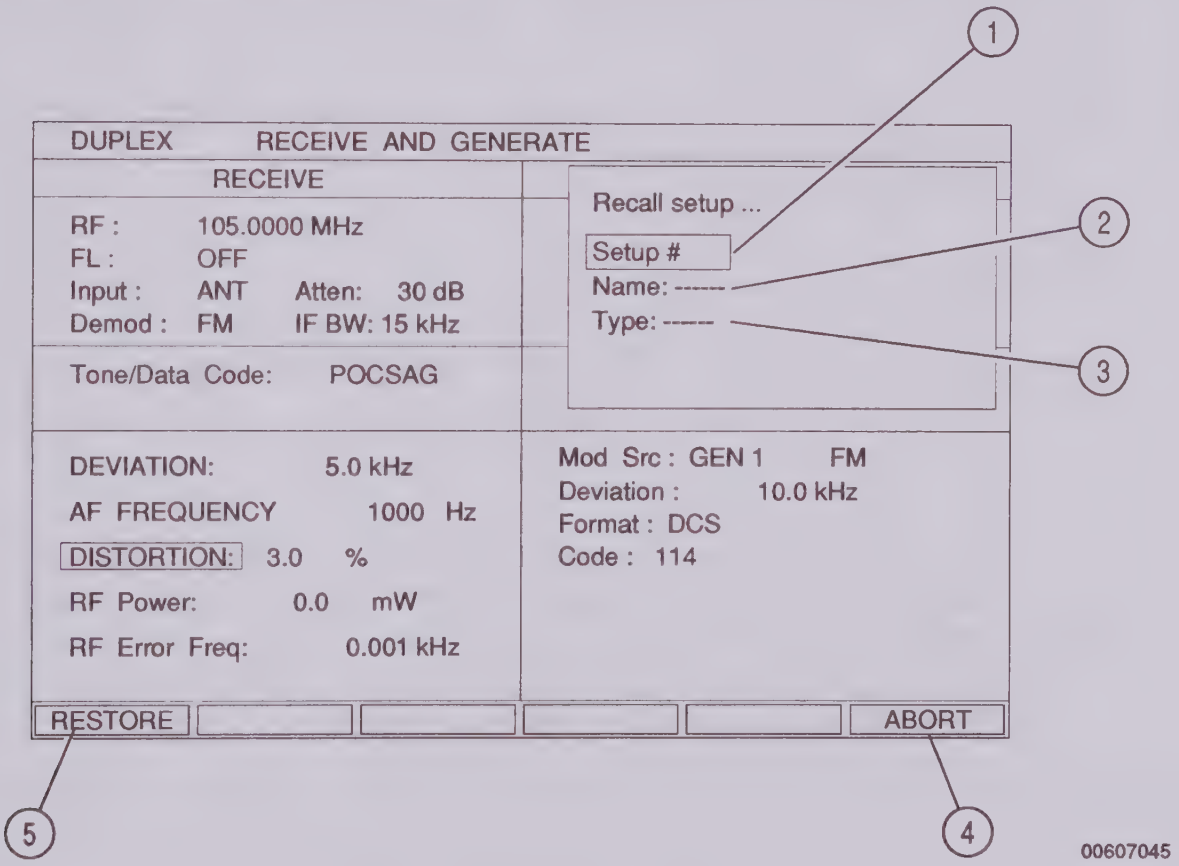
Escapes Storage Operation without editing. Press SAVE Soft Function Key F1 (5) or ABORT Soft Function Key F6 to return to normal operation.

5. SAVE Soft Function Key F1

Finalizes Storage Operation. Press SAVE Soft Function Key F1 or ABORT Soft Function Key F6 (4) to return to normal operation.

Pressing RCL Memory Key allows the operator to recall up to 100 previously stored operation screens. RF Receive, RF Generate or Duplex Operation Screen configurations and all can be accessed from the Duplex Operation Screen. Accessing anything other than a Duplex Operation Screen configuration, automatically switches the COM-120B to the selected mode of operation.

Pressing RCL Memory Key when in Duplex Operation Screen accesses the following fields:



1. Setup #

   Displays selected Memory Location for recall of stored configuration.

2. Name

   Displays optional alphanumeric label for selected Memory Location.

3. Type

   Displays the type of data saved in the specified setup number. Available types to save and recall are: DUPLEX, GENERATOR, RECEIVER, GENERATOR & RECEIVER and EMPTY.

4. ABORT Soft Function Key F6

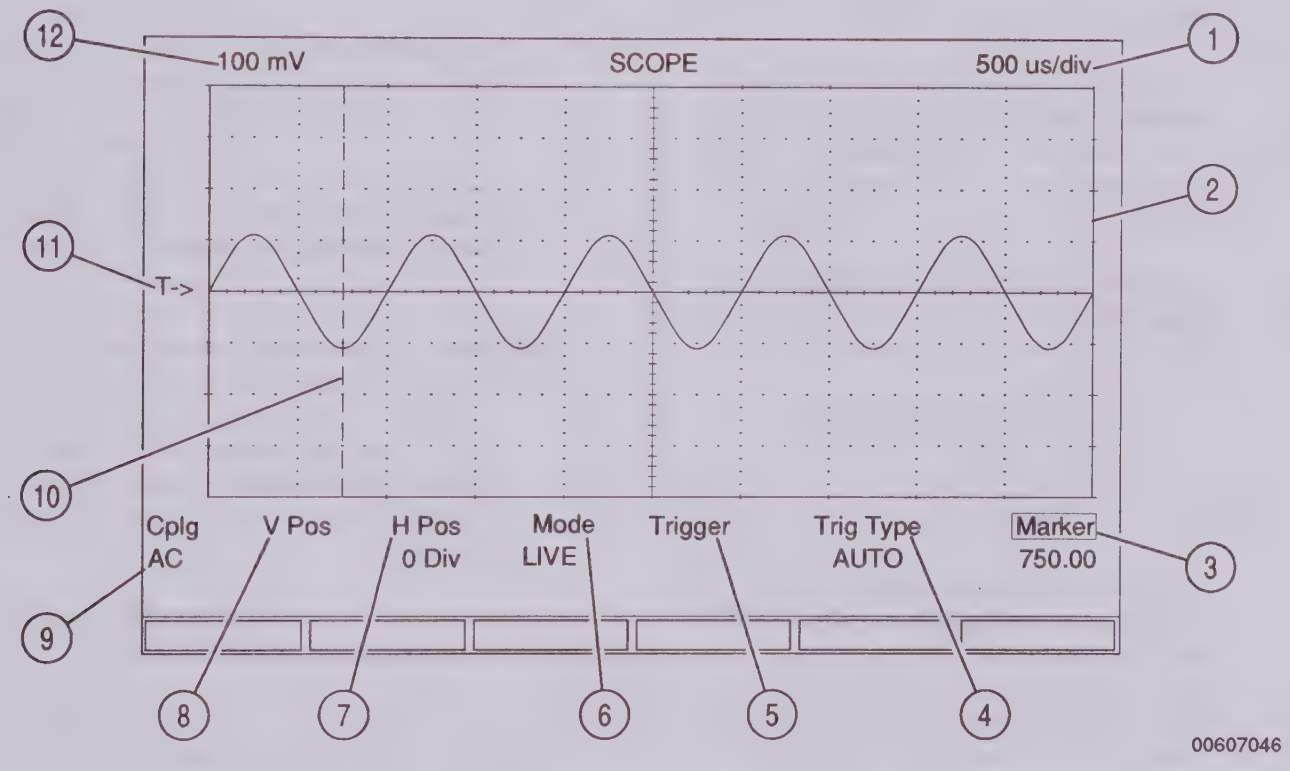
Escapes Storage Operation without performing any edit. Press RESTORE Soft Function Key F1 (5) or ABORT Soft Function Key F6 to return to normal operation.

5. RESTORE Soft Function Key F1

Finalizes Recall Operation. Press RESTORE Soft Function Key F1 or ABORT Soft Function Key F6 (4) to return to normal operation.

3-3-4 OSCILLOSCOPE OPERATION SCREEN

The Independent Oscilloscope Operation Screen operates as an independent piece of test equipment. Input for Oscilloscope Operation is through the SCOPE/DVM Connector. The Oscilloscope Operation Screen is accessed by pressing the SCOPE Instruments Key. When accessed, the Oscilloscope Operation Screen is set up in the configuration last used.



Oscilloscope Operation Screen

1. Sweep

Displays selected Oscilloscope Sweep. Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Scale.

F6 RETURN
Exits Menu into normal operation.

F2 ROLL
Views the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.

F2 SLOW
Returns to the normal mode of operation.

2. Oscilloscope Screen

Displays digitized trace of specified signal.

3. Marker Position

Displays current Marker Position if Marker (10) is active or OFF if inactive. Value for Marker Position is in same units as Sweep (1) with Trigger point as reference.

Soft Function Keys available with this function include:

F1 On/Off
Toggles Marker (10) between ON and OFF.

4. Trigger Type

Displays selected Trigger Type. Selections include Auto, One Shot and Normalized.

Soft Function Keys available with this function include:

F1 NORM
Selects Normalized as Trigger Type.

F2 AUTO
Selects Auto as Trigger Type.

F3 1 SHOT
Selects One Shot as Trigger Type. Pressing 1 SHOT Soft Function Key reenables Trigger.

5. Trigger

Adjusts trigger level as indicated by Trigger Level Indicator (11) when accessed.

6. Mode

Displays selected Operation Mode. Selections include Menu, Average, Pk Hold, Min Hold and Store. Menu displays a menu window with selections Live, Recall, Compare, Live-Ref and Ref-Live. Live displays current signal without modification. Recall displays Stored trace only. Compare displays Stored trace and live trace simultaneously. In Live-Ref, the value of each point of the reference trace is subtracted from the current reading and the result is displayed. In Ref-Live, the value of current reading is subtracted from the stored value and the result is displayed. Both Live-Ref and Ref-Live require a previously stored trace. Average displays average of last four traces. Pk Hold displays and holds the trace peak. Min Hold displays and holds minimum trace. Store places copy of current trace in memory.

Soft Function Keys available with this function include:

F1 MENU
Accesses a Menu with Mode selections.

F1 LIVE
Selects LIVE as Oscilloscope Operation Mode.

F2 RECALL
Selects RECALL as Oscilloscope Operation Mode.

F3 COMPARE
Selects COMPARE as Oscilloscope Operation Mode.

F4 LIVE-REF
Selects LIVE-REF as Oscilloscope Operation Mode.

F5 REF-LIVE
Selects REF-LIVE as Oscilloscope Operation Mode.

F6 RETURN
Exits Menu into Generate Operation Screen.

F2 AVG
Activates/deactivates Average Oscilloscope Operation Mode.

F3 PK HOLD
Activates/deactivates Peak Hold Oscilloscope Operation Mode.

F4 MIN HOLD
Activates/deactivates Minimum Hold Oscilloscope Operation Mode.

F6 STORE
Stores the current trace.

7. H Pos

Displays selected horizontal offset in major divisions. Selections range from -10 to +10 Divisions.

8. V Pos

Accesses vertical position of trace. Trace above or below screen is indicated by straight line trace at top or bottom graticule.

9. Coupling

Displays selected Oscilloscope Coupling. Selections include AC, DC and GND (Ground).

Soft Function Keys available with this function include:

F1 GND
Selects GND (Ground) as Oscilloscope Coupling.

F2 AC
Selects AC as Oscilloscope Coupling.

F3 DC
Selects DC as Oscilloscope Coupling.

10. Marker

User editable Marker controlled using MARKER Position (3). Movable through extent of visible screen.

11. Trigger Level Indicator

Indicates approximate level of Oscilloscope Trigger Level. Editable using TRIGGER (5).

12. Oscilloscope Scale

Displays selected Oscilloscope Vertical Scale. Scales available include:

10 mV	20 mV	50 mV
100 mV	200 mV	500 mV
1 V	2 V	5 V
10 V	20 V	50 V

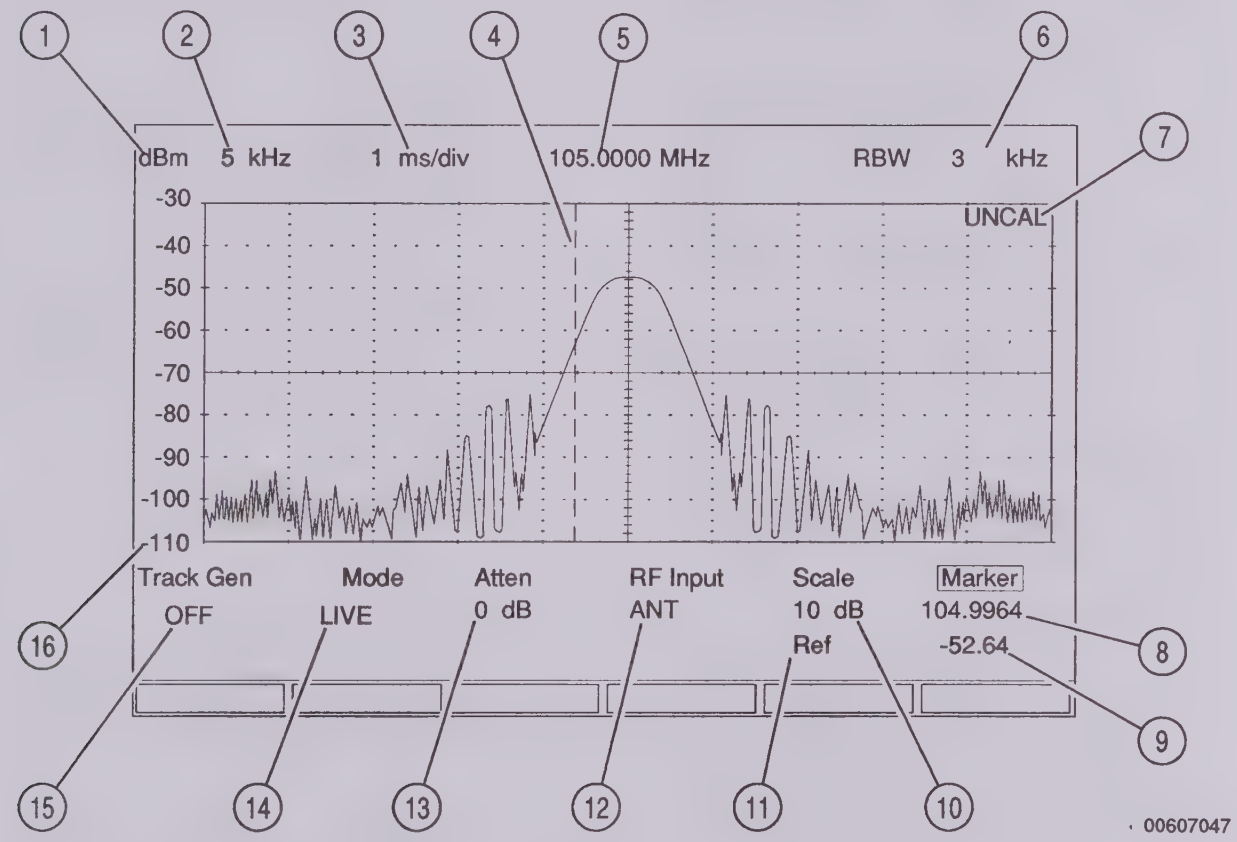
Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Scale. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into normal operation.

3-3-5 SPECTRUM ANALYZER OPERATION SCREEN

The Independent Spectrum Analyzer Operation Screen operates independent of the Test Modes. The Spectrum Analyzer Operation Screen is accessed by pressing the ANLYZ Instruments Key. When accessed, the Spectrum Analyzer Operation Screen is set up in the configuration last used.



Spectrum Analyzer Operation Screen

1. Logarithmic Function

Displays Logarithmic Function for referencing Vertical Scale (14). Selections include dBm, dBµV, dBmV, dBV, dBµW and dBW.

Soft Function Keys available with this function include:

F1 dBm
Selects dBm as Logarithmic Function.

F2 dBµV
Selects dBµV as Logarithmic Function.

Soft Function Keys available with this function include:

F1 On/Off
Toggles Marker (3) between ON and OFF.

9. Marker Level

Displays current Marker Level if Marker (4) is active. Displays Blank if Marker (4) is OFF.

10. Scale

Displays Logarithmic Scale for Vertical Scale (16). Selections are 2 and 10 dB.

F1 10 dB
Selects 10 dB Logarithmic Scale for Spectrum Analyzer Vertical Scale (14).

F2 2 dB
Selects 2 dB Logarithmic Scale for Spectrum Analyzer Vertical Scale (14).

11. Reference

Adjusts Spectrum Analyzer Vertical Scale (16) ±10 dB when Scale (10) is set to 10 dB. When Scale (10) is set to 2 dB, adjusts Spectrum Analyzer Vertical Scale (16) through full range, displaying 16 dB window and incrementing in 1 dB steps.

12. RF Input

Displays RF Input. Selections are ANT (ANTENNA Connector) and T/R (T/R Connector).

Soft Function Keys available with this function include:

F1 T/R
Selects T/R Connector as RF Input Connector.

F2 ANT
Selects ANTENNA Connector as RF Input Connector.

13. Attenuation

Displays selected Attenuation for RF Input (12). Selections include 0 and 30 dB.

Soft Function Keys available with this function include:

F1 30 dB
Selects 30 dB Attenuation for RF Input (12).

F2 0 dB
Selects 0 dB Attenuation for RF Input (12).

14. Mode

Displays selected Operation Mode. Selections include Menu, Average, Peak Hold, Minimum Hold and Store. Menu displays a menu window with selections Live, Recall, Compare, Live-Ref and Ref-Live. Live displays current signal without modification. Recall displays Stored trace only. Compare displays Stored trace and live trace simultaneously. In Live-Ref, the value of each point of the reference trace is subtracted from the current reading and the result is displayed. In Ref-Live, the value of current reading is subtracted from the stored value and the result is displayed. Both Live-Ref and Ref-Live require a previously stored trace. Average displays average of last four traces. Pk Hold displays and holds the trace peak. Min Hold displays and holds minimum trace.

Store places copy of current trace in memory.

Soft Function Keys available with this function include:

F1 MENU
Accesses a Menu with Mode selections.

F1 LIVE
Selects LIVE as Spectrum Analyzer Operation Mode.

F2 RECALL
Selects RECALL as Spectrum Analyzer Operation Mode.

F3 COMPARE
Selects COMPARE as Analyzer Spectrum Operation Mode.

F4 LIVE-REF
Selects LIVE-REF as Spectrum Analyzer Operation Mode.

F5 REF-LIVE
Selects REF-LIVE as Spectrum Analyzer Operation Mode.

F6 RETURN
Exits Menu into Generate Operation Screen.

F2 AVG
Activates/deactivates Average Spectrum Analyzer Operation Mode.

F3 PK HOLD
Activates/deactivates Peak Hold Spectrum Analyzer Operation Mode.

F4 MIN HOLD
Activates/deactivates Minimum Hold Spectrum Analyzer Operation Mode.

F6 STORE
Stores the current trace.

15. Tracking Generator (Option 12)

Displays Tracking Generator Signal level available at AUX RF OUT Connector when active and OFF when inactive. Displayed only with Option 12 installed.

Soft Function Keys available with this function include:

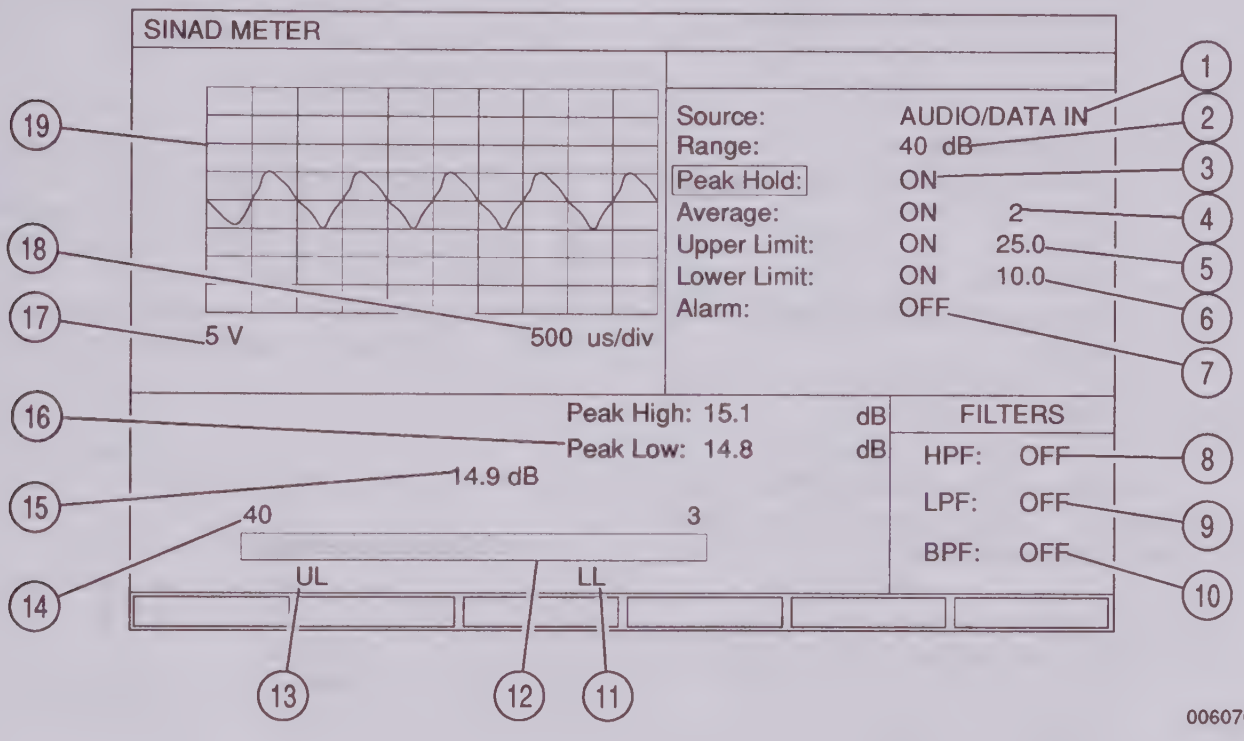
F1 On/Off
Sets Tracking Generator (Option 12) ON or OFF.

16. Vertical Scale

Provides logarithmic scale for trace. Position is controlled by Reference (11).

B. SINAD METER

The SINAD Meter determines SINAD for a 1 kHz tone passed to the COM-120B through the specified Source. Information provided the user is displayed below:



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1. Source

Displays selected source for SINAD Meter. Selections include AUDIO/DATA IN Connector and Scope/DVM Connector.

Soft Function Keys available with this function include:

F1 AUD/DAT
Selects AUDIO/DATA IN Connector as Source for SINAD Meter.

F2 SCP/DVM
Selects Scope/DVM Connector as Source for SINAD Meter.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

2. Range

Displays selected SINAD Meter Upper Range. Selections include Autorange, 15 dB and 40 dB.

Soft Function Keys available with this function include:

F1 15 dB
Selects 15 dB as active upper range for SINAD Meter.

F2 40 dB
Selects 40 dB as active upper range for SINAD Meter.

F3 AUTO
Selects Autorange as active upper range for SINAD Meter. This setting will automatically adjust to a higher or lower upper range if signal increases or decreases to a specified level of the current setting.

F5 RST PK
Resets Peak Readings displayed to 0.

F6 RETURN
Returns Test Set to Meters Menu.

3. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. Not valid in Autorange.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

4. Average

Displays current status of Averaging Function and number of samples when active. Status is Off or On. Range of samples is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

5. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range of value is 0 to 40 dB.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

6. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range of value is 0 to 40 dB.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

4-2 RF GENERATE OPERATION

Pressing the GEN MODE Key accesses the RF Generate Operation Screen. The purpose of the RF Generate Mode is for the COM-120B to act as a transmitter and test a receiver. This section provides information in configuring the COM-120B to perform tests on the receiver.

This section is provided to explain how each of the active fields are edited and what selections are available. It is not designed to perform a specific test, but instead is provided as a reference for operating the RF Generate Operation Screen. Below is a list of Operations available with the RF Generate Operation Screen:

4-2-1 RF Generate General Operation

4-2-2 Generating FM Modulated RF Signal

4-2-3 Generating AM Modulated RF Signal

4-2-4 Generating PM Modulated RF Signal

4-2-5 Generating DCS Coded RF Signal

4-2-6 Generating DTMF Coded RF Signal

4-2-7 Generating RF Signal Using External Modulation

4-2-8 Generating Microphone Modulated RF Signal

4-2-9 Measuring Receiver Center Frequency

4-2-10 Measuring Receiver Sensitivity

4-2-11 Measuring Receiver Selectivity

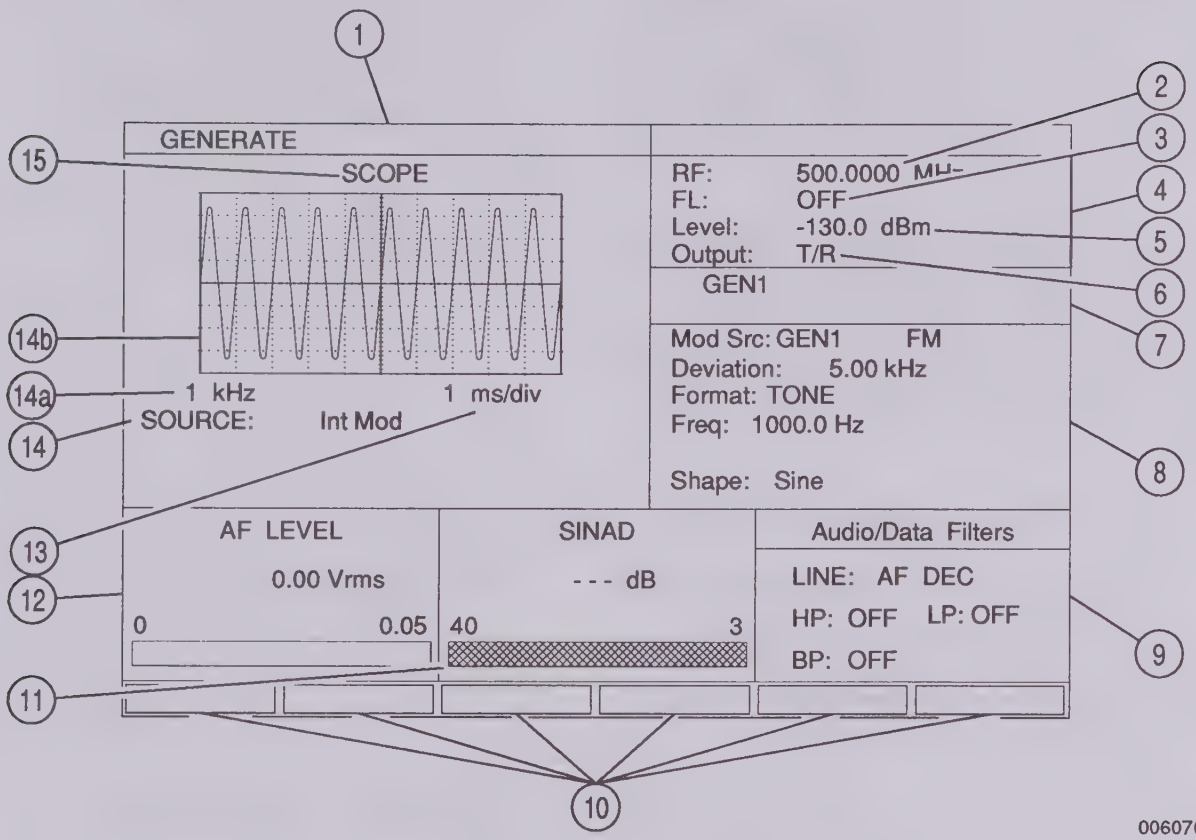
4-2-12 Measuring Receiver Audio Output Level

4-2-13 Measuring Modulation Acceptance Bandwidth

4-2-14 Measuring Receiver IF Bandwidth

4-2-1 RF GENERATOR GENERAL OPERATION

A. RF GENERATE GENERAL OPERATION SCREEN



RF Generator Operation Screen

1. Enter desired frequency in RF Field (2). Frequency range is .0000 to 1000 MHz. Activate additional functions as required as follows:

   - To operate with Δ Function active:
     - Press Δ On/Off Soft Function Key F2 until Δ prompt appears beside RF Field (2).
     - Δ= increment is accessed by pressing Δ= Soft Function Key F1, activating window to set RF Field (2) change increment. Range is 0 to 500 MHz. Press RETURN Soft Function Key F6 to close Change Window.
     - To deactivate Δ Function, press Δ On/Off Soft Function Key F2 until Δ prompt no longer appears beside RF Field (2).
   - To Operate with Set Reference Function, press SET REF Soft Function Key F3 until ***R*** appears beside RF Field (2). When active, RF Field (2) is set to 0 MHz and changes made to RF Field (2) display offset from Reference

Frequency. To deactivate Set Reference Function, press SET REF Soft Function Key until *R* is not visible.

- To Operate with Sweep Operation, press SWEEP Soft Function Key F4 to open Sweep Configuration Window. Once Sweep Configuration Window is opened:
  - Move Cursor to Start Field. Enter Start Frequency for Sweep Operation.
  - Move Cursor to Stop Field. Enter Stop Frequency for Sweep Operation.
  - Move Cursor to Increment Field. Enter Increment for Sweep Operation.
  - Move Cursor to Pause Time Field. Enter time to pause at each frequency.
  - If single sweep is desired, press SINGLE Soft Function Key F3. If continuous sweep is desired, press START Soft Function Key F1. To stop Sweep Function, press STOP Soft Function Key F2. To resume Sweep Operation once stopped, press RESUME Soft Function Key F5.
  - Press RETURN Soft Function Key F6 to exit Sweep Function.

Set Reference Function and Sweep Function cannot be active simultaneously.

- To Operate with RF Generate, RF Receive and Spectrum Analyzer RF Frequencies locked, press LOCK/UNLOCK Soft Function Key F5 until *L* is displayed beside RF Field and UNLOCK is displayed for F5 definition. Press UNLOCK Soft Function Key F5 to set LOCK Function to OFF.

2. If Frequency List Operation is desired instead of entering frequency in RF Field (2), select Frequency List (3) Setting as follows:
   - Select desired Frequency List (3) Type as follows:
     - Press T-Fwd Soft Function Key F2 to select Trunking Forward Channel List.
     - Press T-Rvs Soft Function Key F3 to select Trunking Reverse Channel List.
     - Press C-Fwd Soft Function Key F4 to select Cellular Forward Channel List.
     - Press C-Rvs Soft Function Key F5 to select Cellular Reverse Channel List.
     - Press FL Soft Function Key F6 to select User Defined Frequency List.
   - Press ON/OFF Soft Function Key F1 to active Frequency List (3) Setting.
   - If Cellular Channel List or User Defined Frequency List is selected, enter channel/frequency number. Range of cellular channels is 1 to 1023. Range of Frequency List is 0 to 99.
   - If Trunking Channel List is selected, select channel number. Select Frequency Band by moving cursor to Frequency Band Field and pressing ENTER. Select desired Frequency Band using DATA

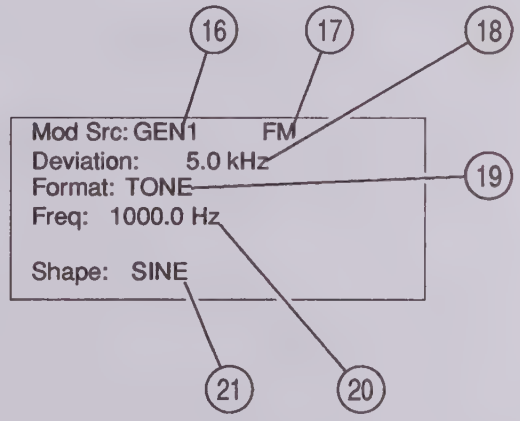
SCROLL Keys or DATA SCROLL Spinner. Press ENTER Key.

3. Set Output Level (5) as follows:

   - Select Output Level Units as follows:
     - Press dBm Soft Function Key F1 to select dBm as Output Level Units.
     - Press uV Soft Function Key F2 to select µV as Output Level Units.
     - Press mV Soft Function Key F3 to select mV as Output Level Units.
     - Press V Soft Function Key F4 to select V as Output Level Units.
   - Once Output Level Units are selected, select Output Level.
   - To operate with SINAD Search Function:
     - Press SINAD= Soft Function Key F5 to access field to set SINAD Search Function value. Range of SINAD = is 6 to 30 dB.
     - Press RETURN Soft Function Key F6.
     - Press S=On/Off Soft Function Key F6 until *S=* is displayed beside Output Level Field to activate SINAD Search Function.
     - Press S=On/Off Soft Function Key F6 until *S=* disappears to deactivate SINAD Search Function.

4. Select Output (6) as follows:

   - Press T/R Soft Function Key F1 to select T/R Connector as output connector.
   - Press AUX Soft Function Key F2 to select AUX RF Connector as output connector.
   - Press T/R Gate Soft Function Key F3 to select T/R Connector as output connector.
   - Press AUX Gate Soft Function Key F4 to select AUX RF Connector as gated output connector.

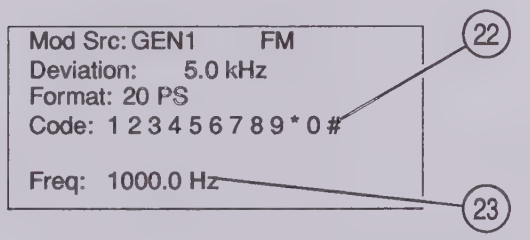


5. Modulation Source Window (7) displays all active Function Generators. To activate or deactivate Function Generators, each Function Generator must be edited separately. If two (or more) sections of the RF Modulator are set in conflict (e.g. GEN1 set for PM and GEN2 set for FM, or GEN1 set for 0.001 kHz deviation and GEN2 set for 2.60 kHz deviation) the screen displays the invalid source grayed out. Set Modulation Source Block (8) as follows:

- If Audio Generator 1 (GEN1) Operation is desired, perform Step 6.
- If Audio Generator 2 (GEN2) Operation is desired, perform Step 7.
- If DATA Generator (DATA) Operation is desired, perform Step 8.
- If DTMF Generator (DTMF) Operation is desired, perform Step 9.
- If External Modulation (EXT) Operation is desired, perform Step 10.
- If Microphone Modulation (MIC) Operation is desired, perform Step 11.

6. If Audio Generator 1 (GEN1) Operation is desired, set Modulation Source Block (8) as follows:
   - Press GEN1 Soft Function Key F1 to select GEN1 for Modulation Source (16).
   - Select Modulation Type (17) as follows:
     - Press OFF Soft Function Key F1 to deactivate GEN1.
     - Press AM Soft Function Key F2 if AM Modulation is desired.
     - Press FM Soft Function Key F3 if FM Modulation is desired.
     - Press PM Soft Function Key F4 if PM Modulation is desired.
   - Enter Deviation/Modulation Level (18). Range is 0.00 to 100 kHz for FM Modulation, 0.0% to 100.0% for AM Modulation and 0.00 to 10 Radians for PM Modulation.
   - Select Format (19). Formats available include TONE and USER.
   - With cursor on Format (19), select transmission type:
     - Press CONT Soft Function Key F2 to select continuous transmission of signal.
     - Press BURST Soft Function Key F3 if single transmission of selected signal.
     - If TONE is selected as Format (19), press TIME Soft Function Key F4 to access Burst TIme WIndow. Enter Burst Time. Press RETURN Soft Function Key F6 to exit Window.
     - IF USER is selected as Format (19), press CONFIG Soft Function Key F4 to access Configuration Window for configuring User Selectable Frequency and Duration for codes 0 through 9 and A through T. Enter desired frequencies and durations for codes. Range of frequencies are 0 to 9999.9 Hz. Range of durations are 0 to 99.999 seconds. Use PG UP Soft Function Key F1 to scroll up through Configuration Window. Use PG DN to scroll down through Configuration Window. Use FILL Soft Function Key F3 to fill remainder of current column with value of current cursor position. Press RETURN Soft Function Key F6 to exit Window.

- If TONE is selected as Format (19):
  - Enter Audio Tone Frequency (20). Range is 5 Hz to 20000 Hz with Shape (21) set to SINE. Range is 5 Hz to 10000 Hz otherwise.
  - Select Shape (21) of Wave as follows:
    - Press SINE Soft Function Key F1 to select SINE Wave Shape.
    - Press RAMP Soft Function Key F2 to select RAMP Wave Shape.
    - Press TRIANGLE Soft Function Key F3 to select TRIANGLE Wave Shape.
    - Press SQUARE Soft Function Key F4 to select SQUARE Wave Shape.



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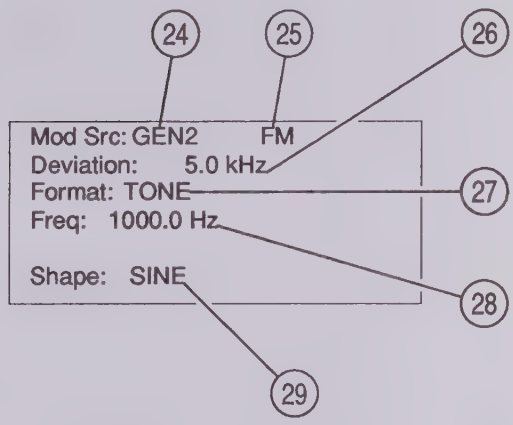
- If TONE is not selected Format (19):
  - Enter Code (22). Pressing CLEAR Soft Function Key F1 clears current code entry.



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7. If Audio Generator 2 (GEN2) Operation is desired, set Modulation Source Block (8) as follows:
   - Press GEN2 Soft Function Key F2 to select GEN2 for Modulation Source (24).
   - Select Modulation Type (25) as follows:
     - Press OFF Soft Function Key F1 to deactivate GEN2.
     - Press AM Soft Function Key F2 if AM Modulation is desired.
     - Press FM Soft Function Key F3 if FM Modulation is desired.
     - Press PM Soft Function Key F4 if PM Modulation is desired.
   - Enter Deviation/Modulation Level (26). Range is 0.00 to 100 kHz for FM Modulation, 0.0% to 100.0% for AM Modulation and 0.00 to 10 Radians for PM Modulation.

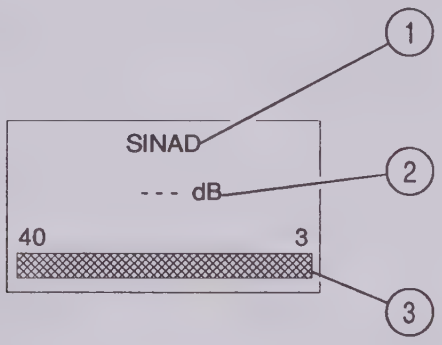
- Select DTMF/SINAD Low-Pass Filter Field (54) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press 4 kHz Soft Function Key F3 to activate 4 kHz Low-Pass Filter.
  - Press 20 kHz Soft Function Key F4 to activate 20 kHz Low-Pass Filter.
- Press EXEC Soft Function Key F5 to Execute all edits made to the screen.
- Select Speaker/Headphones Filter Field (56) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press C-MSG Soft Function Key F2 to select C-Message Weighted Filter.
  - Press W.B. Soft Function Key F3 to select no filtering.
  - Press INT-MOD Soft Function Key F4 to route from Internal Modulation Sources to Speaker.
- Move Cursor off Speaker/Headphones Filter Field (56) and press RETURN Soft Function Key F6 to return to RF Generate Operation Screen.
- To display different Filter Line (48) settings:
  - Press AF DEC Soft Function Key F1 to display DTMF/SINAD Filter Settings.
  - Press SPKR Soft Function Key F2 to display Speaker/ Headphones Filter Settings.

13. Select desired Meter Operation as follows:
    - Press SINAD Soft Function Key F2 to select SINAD Meter as active meter. Not displayed if meter is currently active.
    - Press DIST Soft Function Key F3 to select Distortion Meter as active meter. Not displayed if meter is currently active.
14. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

B. SINAD METER

The SINAD Meter for the RF Generate Operation Screen measures SINAD for an audio signal passed through the AUDIO/DATA IN Connector. Filtering for the signal passed to the SINAD Meter is provided by the Audio/Data Filters.

Configure and operate the SINAD Meter as follows:



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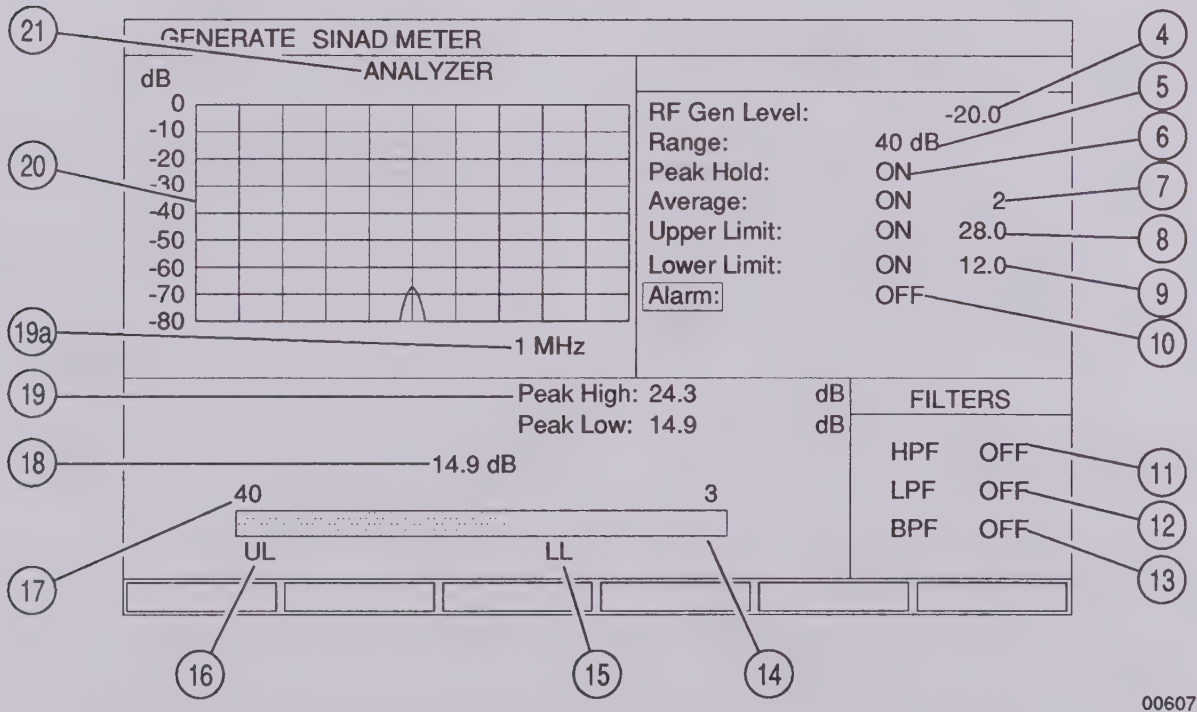

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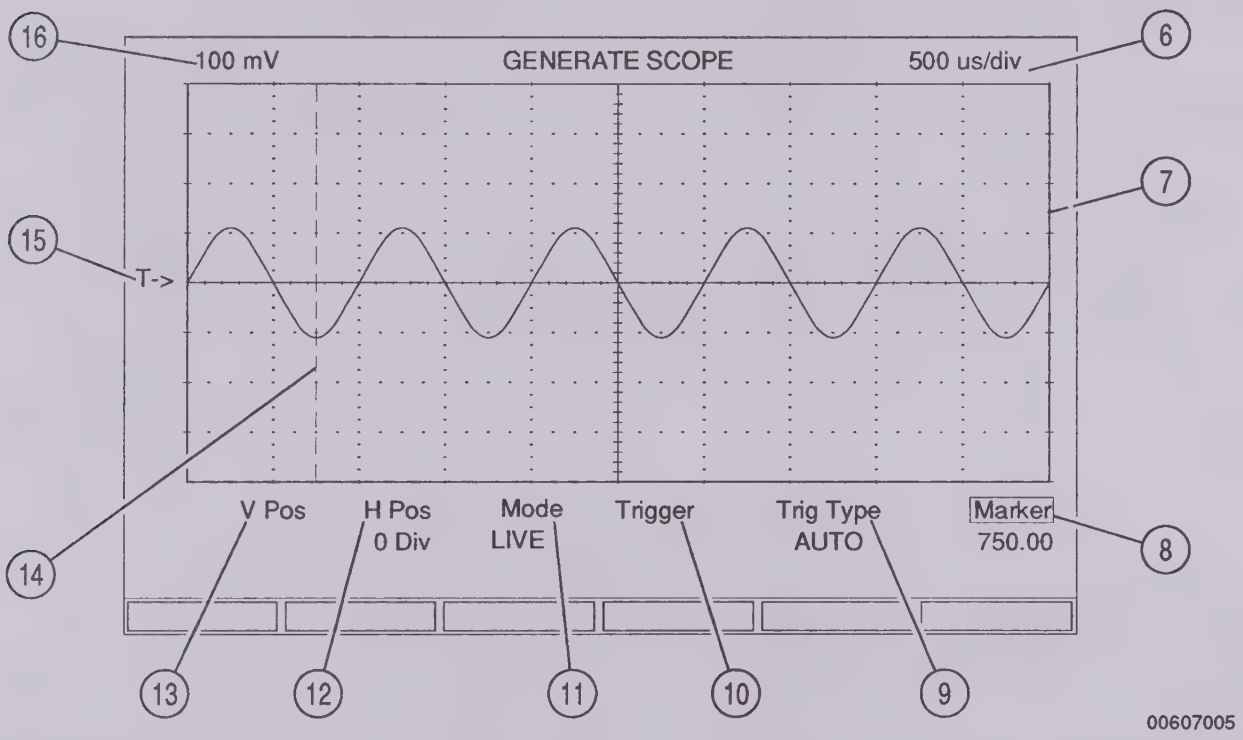
Source	Signal Input	Signal Type
Scope/DVM-GND	SCOPE/DVM Connector	External Ground-Coupled Signal
Scope/DVM-AC	SCOPE/DVM Connector	External AC-Coupled Signal
Scope/DVM-DC	SCOPE/DVM Connector	External DC-Coupled Signal
Ext Mod	EXT MOD IN Connector	External Modulation
Notch Residual	Internal Filtered Signal	Notch Filtered Signal passed to SINAD and Distortion Meters. Reading is relative with no units applied.
Audio/Data In	AUDIO/DATA IN Connector	External Audio or Data Signal
Int Mod	Internal Modulation	Composite Modulation Signal generated by Internal Audio/Data Generators

3. Select Oscilloscope Scale (5). Selections include:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
Ext Mod	100, 200, 500 mV/Div 1, 2, 5 V/Div
Notch Residual	0.002, 0.004, 0.10, 0.20, 0.40, 1.00
Audio/Data In	100, 200, 500 mV/Div 1, 2, 5 V/Div
Int Mod	
GEN1 FM >25 kHz:	1, 2, 5, 10, 20, 50 kHz/Div
GEN1 FM 2.5 to 12.75 kHz:	1, 2, 5, 10, 20, 50 kHz/Div
GEN1 FM 12.75 to 25 kHz:	.2, .4, 1, 2, 4, 10 kHz/Div
GEN1 FM <2.5 kHz:	.2, .4, 1, 2, 4, 10 kHz/Div
GEN1 PM <2.55 RAD:	.2, .4, 1, 4, 10 RAD/Div
GEN1 PM >2.55 RAD:	1, 2, 5, 10, 20,50 RAD/Div
GEN1 AM:	all settings 20%

Pressing ZOOM Soft Function Key F1 accesses full screen Oscilloscope, when cursor is on SCOPE/ANALYZER Prompt (1) of RF Generate Operation Screen and abbreviated Oscilloscope is displayed. SCOPE SOURCE (4) must be selected before Full Screen Oscilloscope is accessed. Configure the full screen Oscilloscope as follows:



1. Select Sweep (6). Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

Press ROLL Soft Function Key F2 to view the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher. Press SLOW Soft Function Key F2 to return to the normal mode of operation.

2. Select Trigger Type (9) as follows:

- Press NORM Soft Function Key F1 to select Normalized Trigger.
- Press AUTO Soft Function Key F2 to select Auto Trigger.
- Press 1 SHOT Soft Function Key F3 to select One Shot Trigger. Press 1 SHOT Soft Function Key F3 as needed to reset Trigger.

3. Set Trigger Level (15) as follows:

- Move cursor to Trigger (10).
- Use DATA SCROLL Spinner or DATA SCROLL Keys to set Trigger.

4. Select Operation Mode (11) as follows:

- Press MENU Soft Function Key F1 to access Operation Mode menu selections.

- Press LIVE Soft Function Key F1 to select Live Operation Mode.
- Press RECALL Soft Function Key F2 to select Recall Operation Mode.
- Press COMPARE Soft Function Key F3 to select Compare Operation Mode.
- Press LIVE-REF Soft Function Key F4 to select Live-Ref Operation Mode.
- Press REF-LIVE Soft Function Key F5 to select Ref-Live Operation Mode.
- Press RETURN Soft Function Key F6 to exit to Generate Scope.

- Press AVG Soft Function Key F2 to select Average Operation Mode.
- Press PK HOLD Soft Function Key F3 to select Peak Hold Operation Mode.
- Press MIN HOLD Soft Function Key F4 to select Minimum Hold Operation Mode.
- Press STORE Soft Function Key F6 to store the current trace.

5. Select H Pos (12) Offset as needed. Range is -10 to 10 Divisions.

6. Set Vertical Position of trace as needed by accessing V Pos (13) and editing with DATA SCROLL Keys or DATA SCROLL Spinner.

7. Select Oscilloscope Scale (16). Selections available are dependent on Scope Source (4). Selections include:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
Ext Mod	100, 200, 500 mV/Div 1, 2, 5 V/Div
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data In	100, 200, 500 mV/Div 1, 2, 5 V/Div
Int Mod GEN1 FM >25 kHz:	1, 2, 5, 10, 20, 50 kHz/Div
GEN1 FM 2.5 to 12.75 kHz:	1, 2, 5, 10, 20, 50 kHz/Div
GEN1 FM 12.75 to 25 kHz:	.2, .4, 1, 2, 4, 10 kHz/Div
GEN1 FM <2.5 kHz:	.2, .4, 1, 2, 4, 10 kHz/Div
GEN1 PM <2.55 RAD:	.2, .4, 1, 4, 10 kHz/Div
GEN1	1, 2, 5, 10, 20,50 RAD/Div
GEN1 AM:	all settings 20%

8. Activate Marker (14), as required, as follows:
   - With Cursor on Marker Position (8), press On/Off Soft Function Key F1.
   - Enter Desired Marker Position using DATA ENTRY Keys or DATA SCROLL Keys and/or DATA SCROLL Spinner.

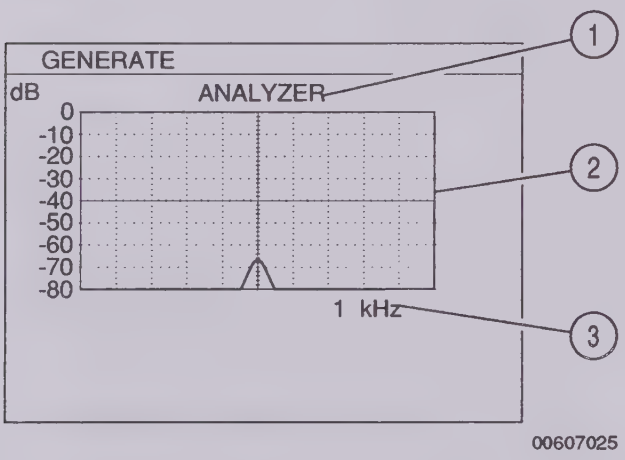
F. SPECTRUM ANALYZER OPERATION SCREEN

The RF Generator Spectrum Analyzer is usable as an abbreviated Spectrum Analyzer or as a Full Screen Spectrum Analyzer. Configuring one is reflected in the other.

The abbreviated Spectrum Analyzer, as shown below, is visible from the RF Generate Operation Screen and the following Meters:

SINAD Meter Operation Screen
Distortion Meter Operation Screen
Audio Frequency Level Meter Operation Screen

Parameters set on any of the above Operation Screens are reflected in all. Configuring the abbreviated Spectrum Analyzer is as follows:



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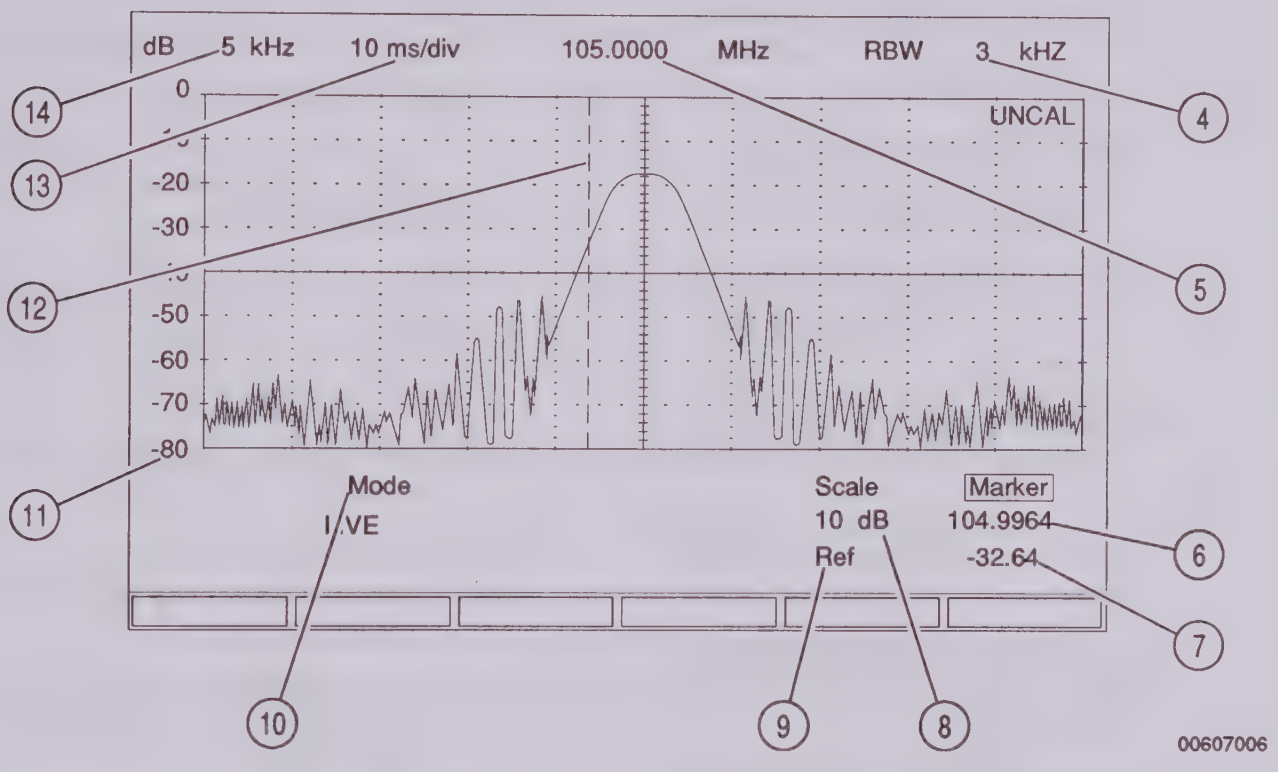
1. Select Scan Width (3). Selections include zero scan and:

1 kHz	2 kHz	5 kHz
10 kHz	20 kHz	50 kHz
100 kHz	200 kHz	500 kHz
1 MHz		

- Press MENU Soft Function Key F1 for menu selections.
- Press CONFIG Soft Function Key F2 to access a pop up screen to configure Scan Width, Resolution Bandwidth (RBW) and Sweep rate.

Pressing ZOOM Soft Function Key F1 accesses full screen Spectrum Analyzer, when cursor is on SCOPE/ANALYZER Prompt (1) of RF Generate Operation Screen and abbreviated Spectrum Analyzer is displayed. Available features and parameters are described below:



1. Set Center Frequency (5). Press Set Ref Soft Function Key F1 to set current Center Frequency as Reference Frequency.

2. Select Scan Width (14). Selections include zero scan and:

1 kHz	2 kHz	5 kHz
10 kHz	20 kHz	50 kHz
100 kHz	200 kHz	500 kHz
1 MHz	2 MHz	5 MHz
10 MHz	20 MHz	50 MHz
100 MHz		

The word "UNCAL" appears in the display when combinations of RBW, frequency span and sweep rate for which the analyzer is not calibrated are used.

3. Set Scale (8) as follows:

   - Press 10 dB Soft Function Key F1 to select 10 dB for Vertical Scale (11).
   - Press 2 dB Soft Function Key F2 to select 2 dB for Vertical Scale (11).

4. Select Mode (10) as follows:

   - Press MENU Soft Function Key F1 to access Operation Mode menu selections.
     - Press LIVE Soft Function Key F1 to select Live Operation Mode.
     - Press RECALL Soft Function Key F2 to select Recall Operation Mode.

- Press COMPARE Soft Function Key F3 to select Compare Operation Mode.
- Press LIVE-REF Soft Function Key F4 to select Live-Ref Operation Mode.
- Press REF-LIVE Soft Function Key F5 to select Ref-Live Operation Mode.
- Press RETURN Soft Function Key F6 to exit to Generate Analyzer.

- Press AVG Soft Function Key F2 to select Average Operation Mode.
- Press PK HOLD Soft Function Key F3 to select Peak Hold Operation Mode.
- Press MIN HOLD Soft Function Key F4 to select Minimum Hold Operation Mode.
- Press STORE Soft Function Key F6 to store the current trace.

5. Activate Marker (12), as required, as follows:

   - With Cursor on Marker Position (6), press On/Off Soft Function Key F1.
   - Enter Desired Marker Position using DATA ENTRY Keys or DATA SCROLL Keys and/or DATA SCROLL Spinner.

6. Access Ref (9) Field to adjust Vertical Scale (11), as needed.

7. If Scan Width (14) is set to zero scan, enter Zero Scan Sweep (13). Selections Include:

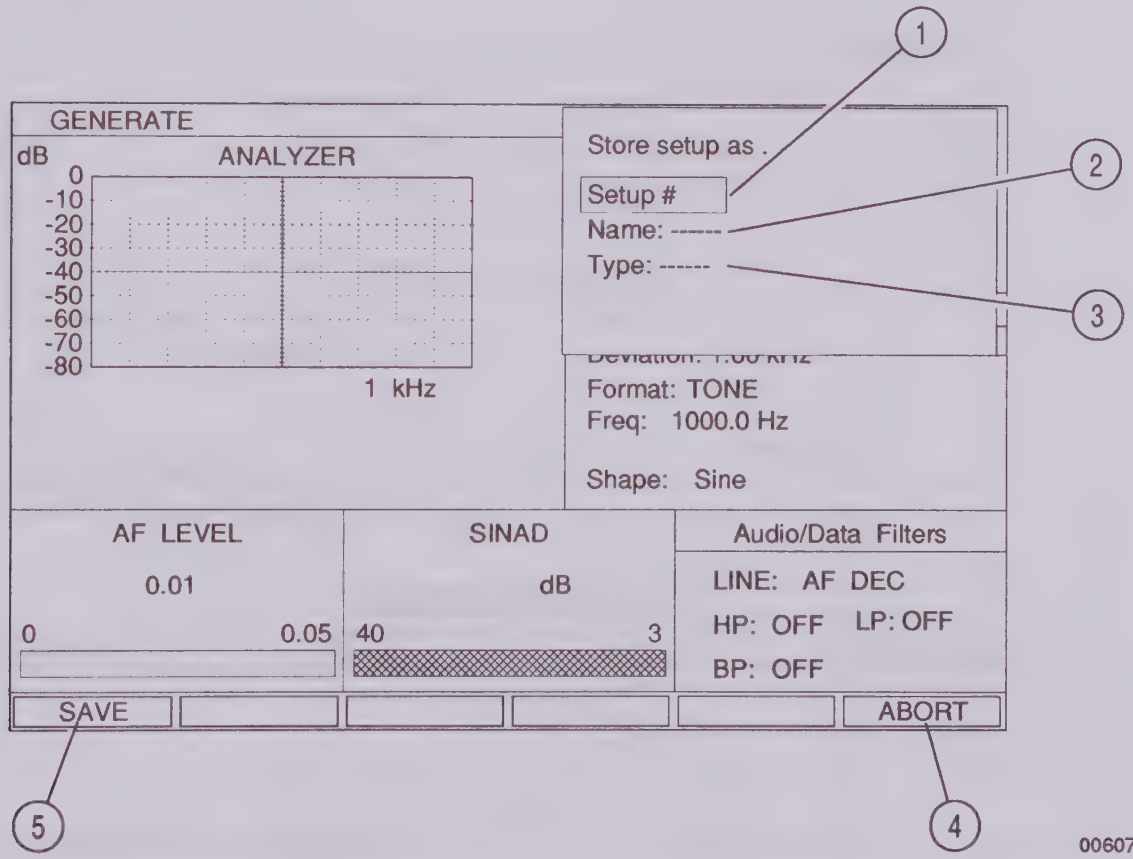
200 µs/div	500 µs/div	1 ms/div
2 ms/div	5 ms/div	10 ms/div
20 ms/div	50 ms/div	100 ms/div
200 ms/div	500 ms/div	

   - Press MENU Soft Function Key F1 to set Zero Scan Sweep.
   - Press Press RETURN Soft Function Key F6 to exit into normal operation.
   - Press DEFLT Soft Function Key F5 to set the current field to factory default.
   - Press COUPLE Soft Function Key F6 to set the sweep and RBW to factory default state for the current scan width.

G. STORE AND RECALL OPERATION

Pressing STORE Memory Key allows the operator to store up to 50 RF Generate Operation Screen configurations. Storage Locations 0 through 49 can be used to store a RF Generate Operation configuration, a RF Receive Operation configuration or a Duplex Operation configuration (Receive and Generate pair).

STORE Operation for RF Generate Operation is as follows:



1. Press STORE MEMORY Key.

2. Enter or scroll through Setup # (1) value. Range is 0 to 49. Press ENTER Key.

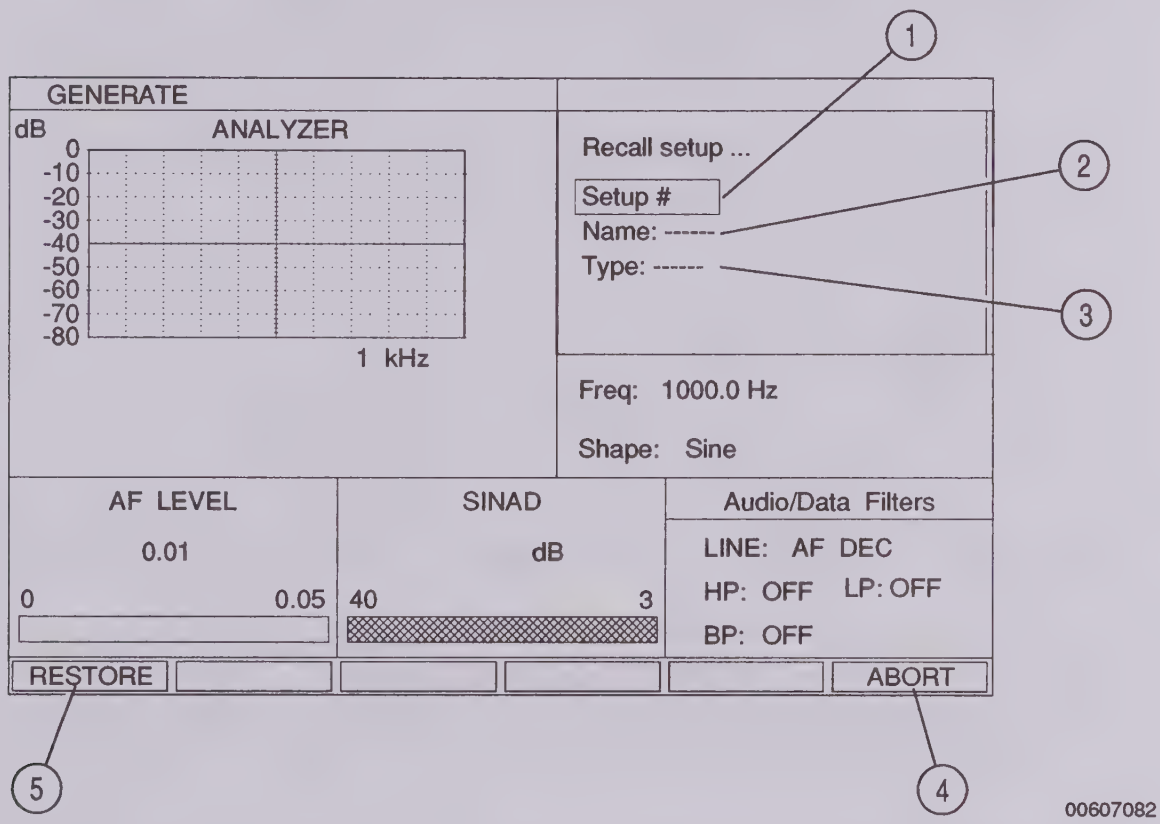
3. If Name (2) is desired, press ENTER Key, with Cursor on Name (2). Enter Name using DATA ENTRY Keys. Name can be alphabetic and/or numeric characters. Press ENTER Key.

4. Type (3) displays the type of data currently saved in the specified setup number. Types saved are: DUPLEX, GENERATOR, RECEIVER, GENERATOR & RECEIVER and EMPTY.

5. Press SAVE Soft Function Key F1 (5) to accept selections and save Setup. Press ABORT Soft Function Key F6 (4) to escape without saving Setup.

Pressing RCL Memory Key allows the operator to recall up to 50 previously stored setups. RF Receive, RF Generate or Duplex Operation Screen configurations and all be accessed from the RF Generate Operation Screen. Accessing anything other than an RF Generate Operation Screen configuration, automatically switches the COM-120B to the selected mode of operation.

RECALL Operation for RF Generate Operation is as follows:



1. Press RECALL MEMORY Key.

2. Enter Setup # (1) value. Range is 0 to 49. Press ENTER Key.

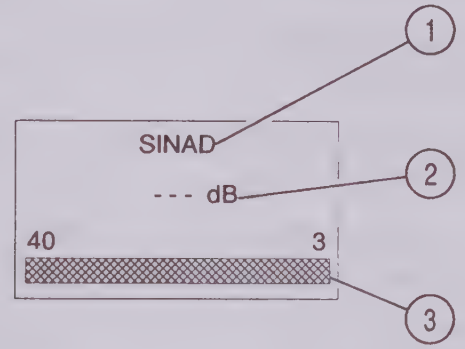
3. Type (3) displays the type of data currently saved in the specified setup number. Types recalled are: DUPLEX, GENERATOR, RECEIVER, GENERATOR & RECEIVER and EMPTY.

4. Press RESTORE Soft Function Key F1 (5) to accept selections and recall Setup. Press ABORT Soft Function Key F6 (4) to escape without recalling Setup.

B. SINAD METER

The SINAD Meter for the RF Receiver measures SINAD for a 1 kHz tone demodulated from an RF Signal. Filtering, for the signal passed to the SINAD Meter, is provided by the Audio/Data Filters.

Configure and operate the SINAD Meter as follows:



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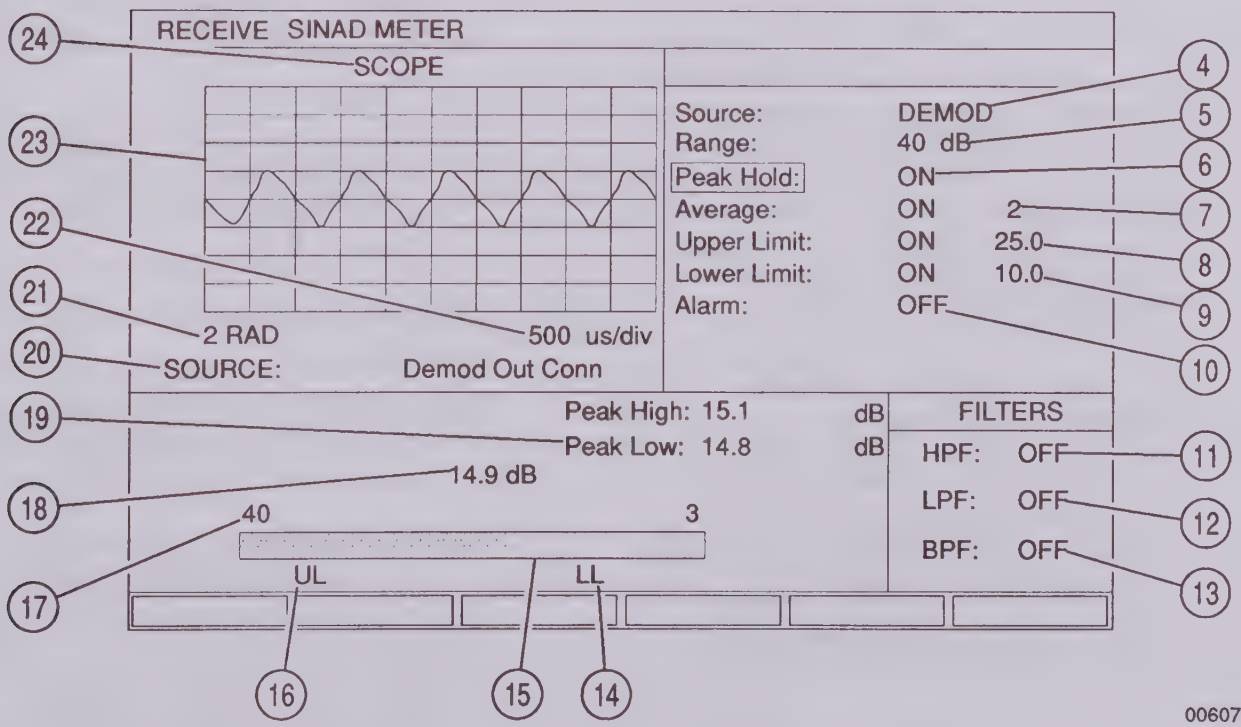

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1. With cursor on SINAD/Distortion/ Modulation Meter Label (1), press ZOOM Soft Key F1. Full Screen SINAD Meter is displayed.

2. Select Range (5) as follows:

   - Press 15 dB Soft Function Key F1 to select 15 dB Range (5).
   - Press 30 dB Soft Function Key F2 to select 30 dB Range (5).
   - Press AUTO Soft Function Key F3 to select Autorange for Range (5).

3. If Peak Hold Function is desired, do not select Autorange. Configure as follows:

   - With cursor on Peak Hold (6), press OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***OFF***.

4. If Average Function is desired, configure as follows:

   - With cursor on Average (7), press OFF/ON Soft Function Key F1 until Average (7) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (7) displays ***OFF***.

5. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (8), press OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 40.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***OFF***.

6. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (9), press OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 40.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***OFF***.

7. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (10), press OFF/ON Soft Function Key F1 until Alarm (10) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (10) displays ***OFF***.

8. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

1. With cursor on SINAD/Distortion/ Modulation Meter Label (1), press ZOOM Soft Key F1. Full Screen Distorion Meter is displayed.

2. If Peak Hold Function is desired, do not select Autorange. Configure as follows:

   - With cursor on Peak Hold (6), press OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***OFF***.

3. If Average Function is desired, configure as follows:

   - With cursor on Average (7), press OFF/ON Soft Function Key F1 until Average (7) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (7) displays ***OFF***.

4. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (8), press OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0% to 20%.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***OFF***.

5. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (9), press OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0% to 20%.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***OFF***.

6. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (10), press OFF/ON Soft Function Key F1 until Alarm (10) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (10) displays ***OFF***.

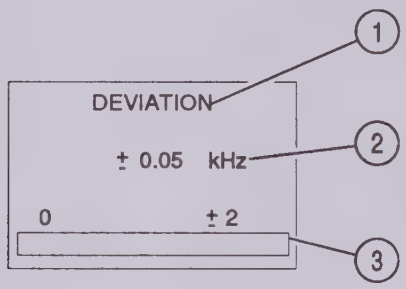
7. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

8. If displayed, press RETURN Soft Function Key F6 to return to RF Receive Operation Screen. Alternately, press REC MODE Key to return to RF Receive Operation Screen.

D. FM DEVIATION METER

The FM Deviation Meter for the RF Receiver measures FM Deviation for an RF Signal. Filtering, for the signal passed to the FM Deviation Meter, is provided by the Audio/ Data Filters.

Configure and operate the FM Deviation Meter as follows:



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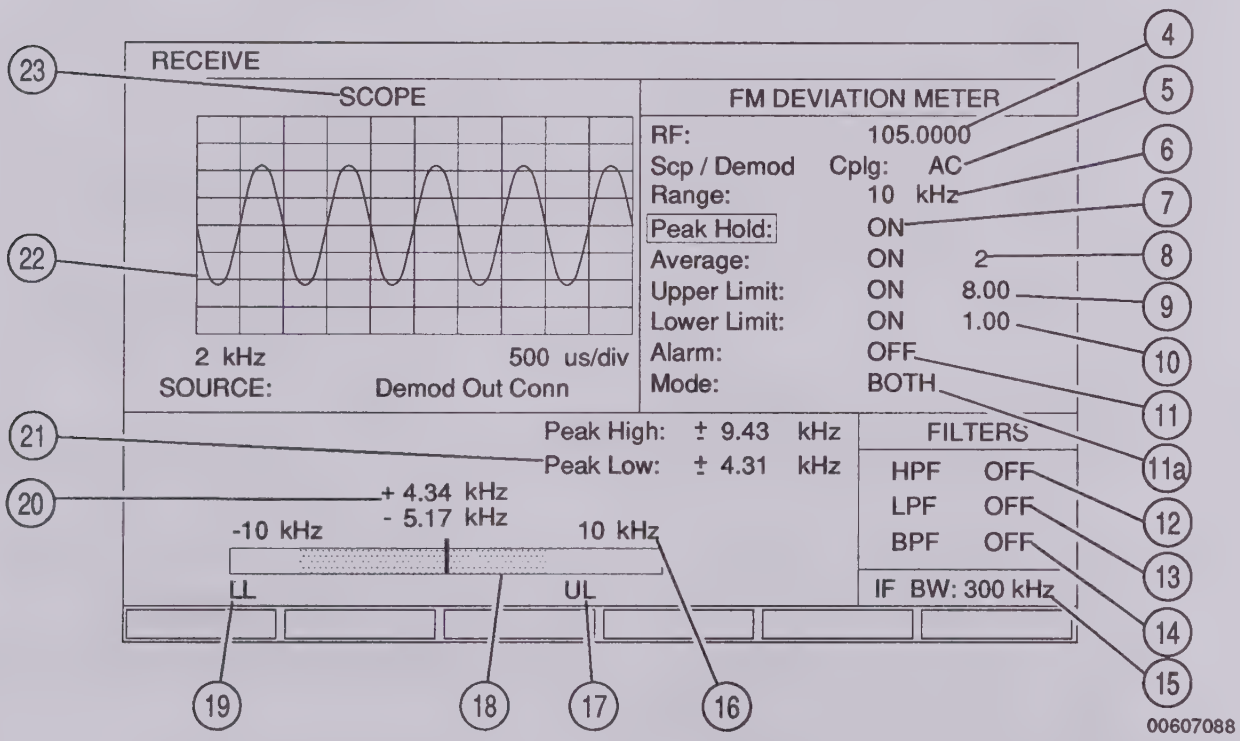

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K. OSCILLOSCOPE OPERATION SCREEN

The RF Receive Oscilloscope is usable as an abbreviated Oscilloscope and as a Full Screen Oscilloscope. Configuring one is reflected in the other.

The abbreviated Oscilloscope, as shown below, is visible from the RF Receive Operation Screen and the following meters:

SINAD Meter Operation Screen
Distortion Meter Operation Screen
FM Deviation Meter Operation Screen
Phase Modulation Meter Operation Screen
RF Power Meter Operation Screen
Received Level Meter Operation Screen
RF Frequency Error Meter Operation Screen
Audio Frequency Counter Operation Screen

Parameters set on any of the Operation Screens are reflected in all. Configuring the abbreviated Oscilloscope is as follows:

1. Select Sweep (3). Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

Press ROLL Soft Function Key F2 to view the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher. Press SLOW Soft Function Key F2 to return to the normal mode of operation.

2. Select SCOPE SOURCE (4). Selections include:

SCOPE SOURCE (4)	Signal Input	Signal Type
Scope/DVM-GND	SCOPE/DVM Connector	External Ground-Coupled Signal
Scope/DVM-AC	SCOPE/DVM Connector	External AC-Coupled Signal
Scope/DVM-DC	SCOPE/DVM Connector	External DC-Coupled Signal
AF Cntr	Audio Frequency Counter Signal	Demodulated Signal passed through filters to Audio Frequency Counter.
Notch Residual	Internal Filtered Signal	Notch Filtered Signal passed to SINAD and Distortion Meters. Reading is relative with no units applied.
Audio/Data/Gen Out	AUDIO/DATA OUT Connector	Composite signal of Audio/Data Generators
DTMF/SINAD	Signal applied to Audio Frequency Decoder, SINAD and Distortion Meters	Demodulated Signal passed through filters to Audio Frequency Decoder, SINAD and Distortion Meters
Data Decoder	Signal applied to Data Decoder	Demodulated Signal passed through filters to Data Decoder
RF Power	RF Power Meter Input	Relative to detected signal applied to RF Power Meter
Detector Out	Demodulated Audio	Unfiltered Demodulated Signal
Demod Out Connector	DEMOD Connector	Filtered Demodulated Signal applied to DEMOD Connector
Mod Meters	Modulation Meters source	Filtered Demodulated Signal applied to selected Modulation Meter.

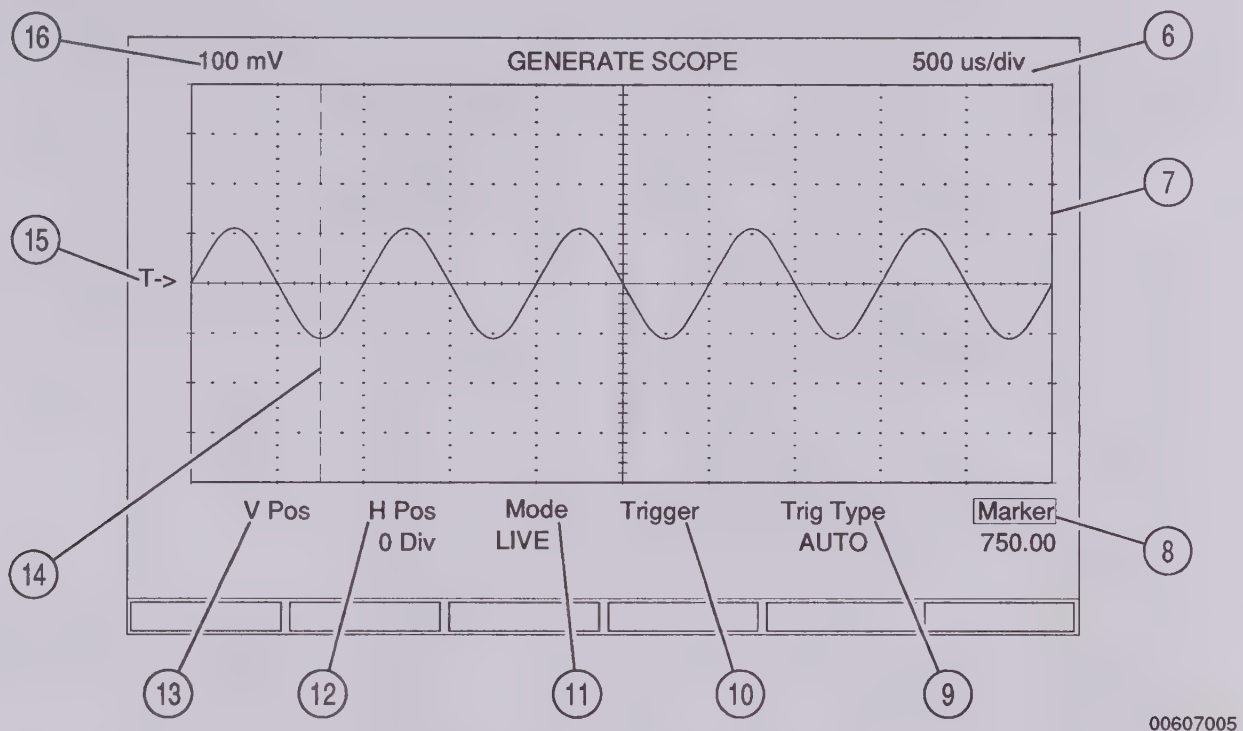
3. Select Oscilloscope Scale. Selections include:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
AF Cntr	0.02, 0.04, 0.10, 0.20, 0.40, 1.00

SCOPE SOURCE (4)	Available Scales
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data/Gen Out	20, 40, 100, 200, 400 mV 1 V
DTMF/SINAD	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
Data Decoder	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
RF Power	Low, Med, High (Selection is automatic depending on power provided to T/R Connector)

SCOPE SOURCE (4)	Available Scales
Detector Out	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
Demod Out Connector	.02, .04, .1, .2, .4, 1.00
Mod Meters	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians

Pressing ZOOM Soft Function Key F1 accesses full screen Oscilloscope, when cursor is on SCOPE/ANALYZER Prompt (1) of RF Receive Operation Screen and abbreviated Oscilloscope is displayed. Scope Source (4) must be selected before Full Screen Oscilloscope is accessed. Configuring the full screen Oscilloscope is as follows:



1. Select Sweep (6). Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

   - Press ROLL Soft Function Key F2 to view the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.
   - Press SLOW Soft Function Key F2 to return to the normal mode of operation.

2. Select Trigger Type (9) as follows:
   - Press NORM Soft Function Key F1 to select Normalized Trigger.
   - Press AUTO Soft Function Key F2 to select Auto Trigger.
   - Press 1 SHOT Soft Function Key F3 to select One Shot Trigger. Press 1 SHOT Soft Function Key F3 as needed to reset Trigger.

3. Set Trigger (10) using DATA SCROLL Spinner or DATA SCROLL Keys. Trigger Level (15) displays level required to trigger Oscilloscope in 1 SHOT or NORM.

4. Select Operation Mode (11) as follows:
   - Press MENU Soft Function Key F1 to access Operation Mode menu selections.

- Press LIVE Soft Function Key F1 to select Live Operation Mode.
- Press RECALL Soft Function Key F2 to select Recall Operation Mode.
- Press COMPARE Soft Function Key F3 to select Compare Operation Mode.
- Press LIVE-REF Soft Function Key F4 to select Live-Ref Operation Mode.
- Press REF-LIVE Soft Function Key F5 to select Ref-Live Operation Mode.
- Press RETURN Soft Function Key F6 to exit to Generate Scope.

- Press AVG Soft Function Key F2 to select Average Operation Mode.
- Press PK HOLD Soft Function Key F3 to select Peak Hold Operation Mode.
- Press MIN HOLD Soft Function Key F4 to select Minimum Hold Operation Mode.
- Press STORE Soft Function Key F6 to store current trace.

5. Select H POS (12) Offset as needed. Range is -10 to 10 Divisions.

6. Set Vertical Position of trace as needed by accessing V POS (13) and editing with DATA SCROLL Keys or DATA SCROLL Spinner.

7. Select Oscilloscope Scale (16). Selections available are dependent on Scope Source (4). Selections include:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
AF Cntr	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data/Gen Out	20, 40, 100, 200, 400 mV 1 V
AF Dec/SINAD	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
Data Decoder	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
RF Power	Low, Med, High (Selection is automatic depending on power provided to T/R Connector)
Detector Out	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
Demod Out Connector	.02, .04, .1, .2, .4, 1.00
Mod Meters	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians

8. Activate Marker (14), as required, as follows:

   - With Cursor on Marker Position (8), press On/Off Soft Function Key F1.
   - Enter Desired Marker Position using DATA ENTRY Keys or DATA SCROLL Keys and/or DATA SCROLL Spinner.

L. SPECTRUM ANALYZER OPERATION SCREEN

The RF Receive Spectrum Analyzer is usable as an abbreviated Spectrum Analyzer or as a Full Screen Spectrum Analyzer. Configuring one is reflected in the other.

The abbreviated Spectrum Analyzer, as shown below, is visible from the RF Receive Operation Screen and the following Meters:

SINAD Meter Operation Screen
Distortion Meter Operation Screen
FM Deviation Meter Operation Screen
AM Modulation Meter Operation Screen
Phase Modulation Meter Operation Screen
RF Power Meter Operation Screen
Received Level Meter Operation Screen
RF Frequency Error Meter Operation Screen
Audio Frequency Counter Operation Screen

Parameters set on any of the above Operation Screens are reflected in all. Configuring the abbreviated Spectrum Analyzer is as follows:

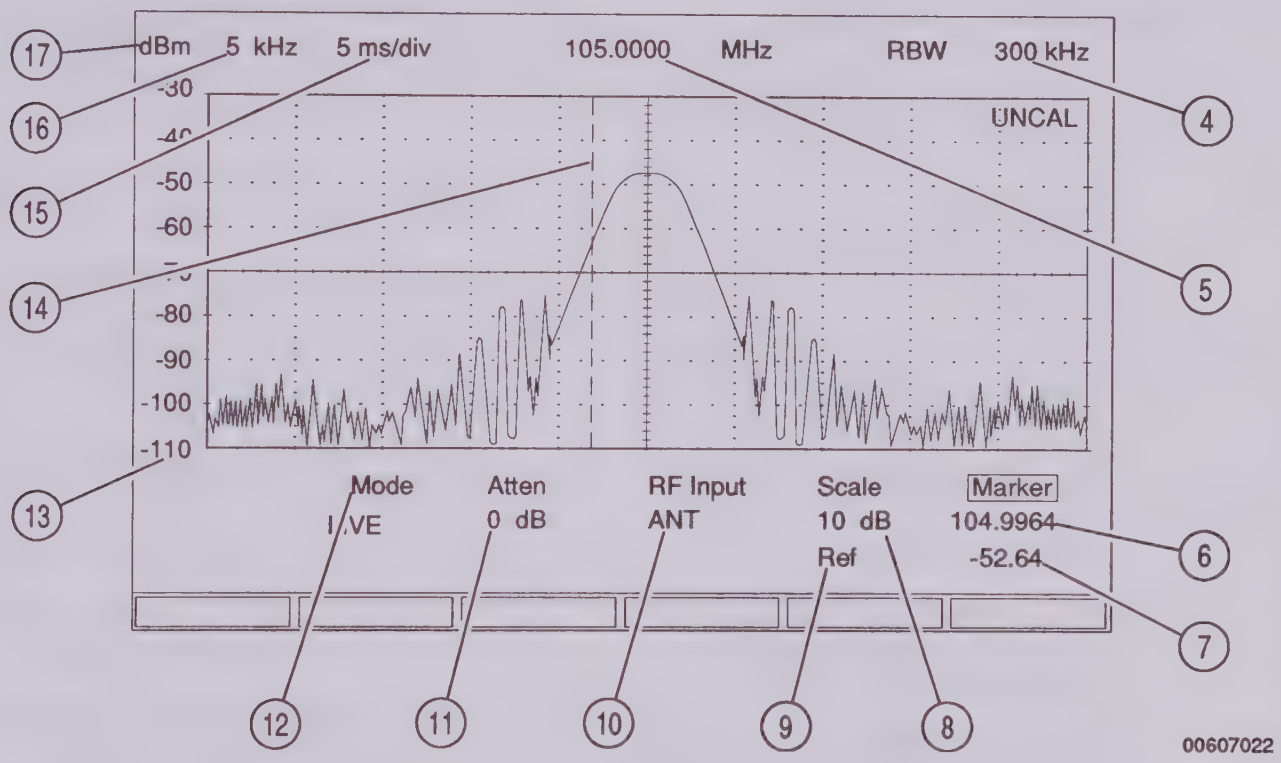
1. Select Scan Width (3). Selections include zero scan and:

1 kHz	2 kHz	5 kHz
10 kHz	20 kHz	50 kHz
100 kHz	200 kHz	500 kHz
1 MHz		

Press MENU Soft Function Key F1 to access a scan width menu. Press RETURN Soft Function Key F6 to exit to normal operation.

Press CONFIG Soft Function Key F2 to access a pop up screen to configure scan width. Press COUPLE Soft Function Key F1 to set the sweep and RBW to factory default state for the current scan width. Press RETURN Soft Function Key F6 to exit to normal operation.

Pressing ZOOM Soft Function Key F1 accesses full screen Spectrum Analyzer, when cursor is on SCOPE/ANALYZER Prompt (1) of RF Receive Operation Screen and abbreviated Spectrum Analyzer is displayed. Available features and parameters are described below:



1. Set Center Frequency (5). Press Set Ref Soft Function Key F1 if current Center Frequency is to used as Reference Frequency.

2. Select Scan Width (15). Selections include zero scan and:

1 kHz	2 kHz	5 kHz
10 kHz	20 kHz	50 kHz
100 kHz	200 kHz	500 kHz
1 MHz	2 MHz	5 MHz
10 MHz	20 MHz	50 MHz
100 MHz		

3. Set Logarithmic Function (16) as follows:

   - Press dBm Soft Function Key F1 to select dBm.
   - Press dBµV Soft Function Key F2 to select dBµV.
   - Press dBmV Soft Function Key F3 to select dBmV.
   - Press dBV Soft Function Key F4 to select dBV.
   - Press dBµW Soft Function Key F5 to select dBµW.
   - Press dBW Soft Function Key F6 to select dBW.

4. Set Scale (8) as follows:

   - Press 10 dB Soft Function Key F1 to select 10 dB for Vertical Scale (13).

- Press 2 dB Soft Function Key F2 to select 2 dB for Vertical Scale (13).

5. Select Mode (12) as follows:

   - Press MENU Soft Function Key F1 to access Operation Mode menu selections.

     - Press LIVE Soft Function Key F1 to select Live Operation Mode.

     - Press RECALL Soft Function Key F2 to select Recall Operation Mode.

     - Press COMPARE Soft Function Key F3 to select Compare Operation Mode.

     - Press LIVE-REF Soft Function Key F4 to select Live-Ref Operation Mode.

     - Press REF-LIVE Soft Function Key F5 to select Ref-Live Operation Mode.

     - Press RETURN Soft Function Key F6 to exit to Generate Analyzer.

   - Press AVG Soft Function Key F2 to select Average Operation Mode.

   - Press PK HOLD Soft Function Key F3 to select Peak Hold Operation Mode.

   - Press MIN HOLD Soft Function Key F4 to select Minimum Hold Operation Mode.

   - Press STORE Soft Function Key F6 to store the current trace.

6. Activate Marker (14), as required, as follows:

   - With Cursor on Marker Position (6), press On/Off Soft Function Key F1.

   - Enter Desired Marker Position using DATA ENTRY Keys or DATA SCROLL Keys and/or DATA SCROLL Spinner.

7. Access Ref (9) Field to adjust Vertical Scale (13), as needed.

8. Select RF Input (10) as needed.

   - Press T/R Soft Function Key F1 to select T/R Connector.

   - Press ANT Soft Function Key F2 to select ANTENNA Connector.

9. Select Attenuation (11) as needed.

   - Press 30 dB Soft Function Key F1 to select 30 dB Attenuation.

   - Press 0 dB Soft Function Key F2 to select 0 dB Attenuation.

10. If Scan Width (15) is set to zero scan, enter Zero Scan Sweep (17). Selections Include:

200 µs/div	500 µs/div	1 ms/div
2 ms/div	5 ms/div	10 ms/div
20 ms/div	50 ms/div	100 ms/div
200 ms/div	500 ms/div	

   - Press MENU Soft Function Key F1 to access the sweep menu. Press RETURN to exit into normal operation.

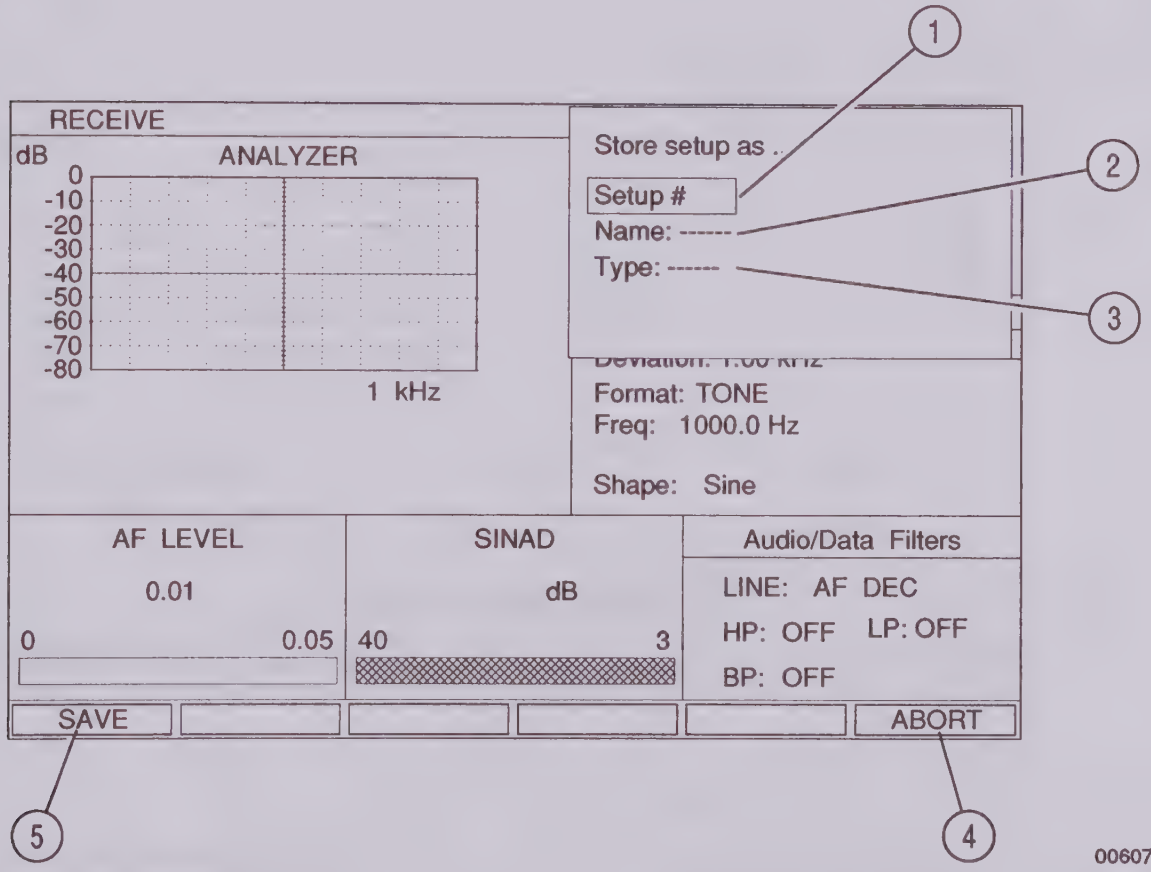
   - Press DEFLT Soft Function Key F5 to set only the current field to factory default.

   - Press COUPLE Soft Function Key to set the sweep and RBW to factory default state for the current scan width.

M. STORE AND RECALL OPERATION

Pressing STORE Memory Key allows the operator to store up to 100 RF Receive Operation Screen configurations. Storage Locations 0 through 49 can be used to store a RF Generate Operation configuration, a RF Receive Operation configuration or a Duplex Operation configuration (Receive and Generate pair).

STORE Operation for the RF Receive Operation is as follows:



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1. Press STORE MEMORY Key.

2. Enter Setup # (1) value. Range is 0 to 49. Press ENTER Key.

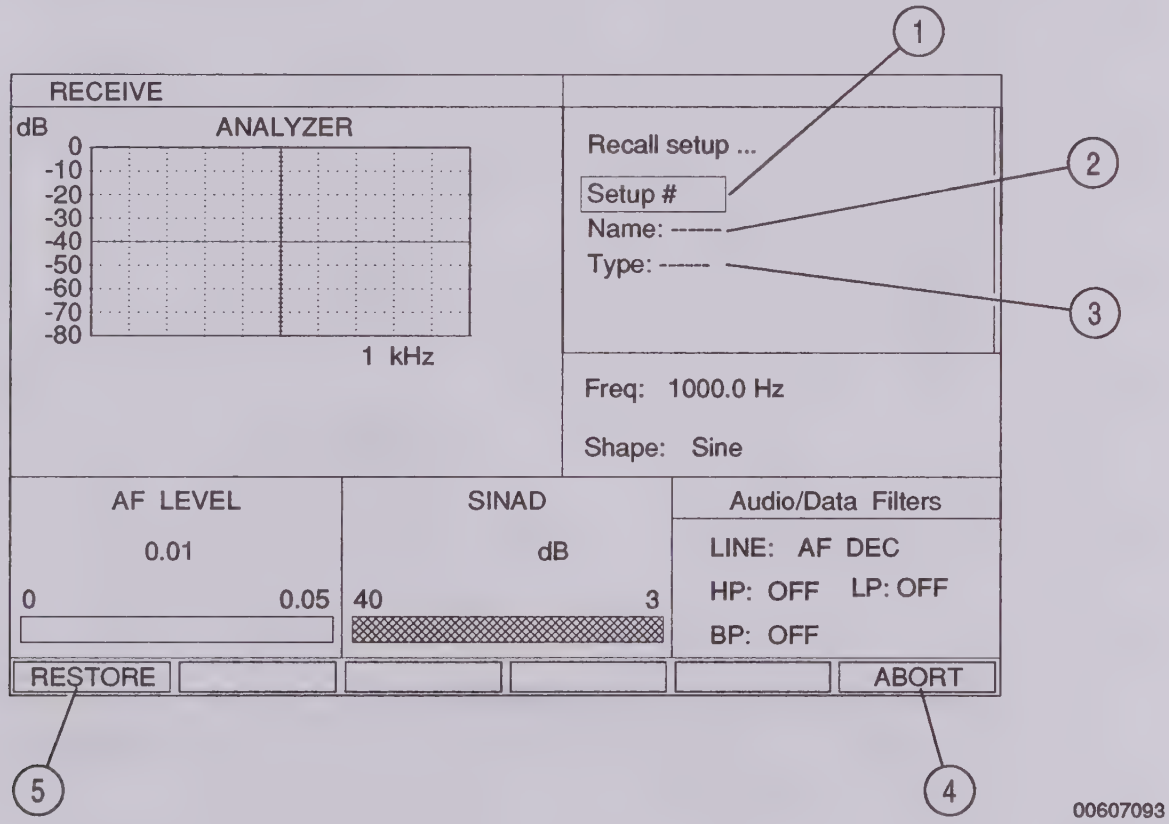
3. If Name (2) is desired, press ENTER Key, with Cursor on Memory Location Label (2) field. Enter Label using DATA ENTRY Keys. Label can be alphabetic and/or numeric characters. Press ENTER Key.

4. Type (3) displays the type of data saved in the specified setup number. Types to save and recall are: DUPLEX, GENERATOR, RECEIVER, GENERATOR & RECEIVER and EMPTY.

5. Press SAVE Soft Function Key F1 (5) to accept selections and save Setup. Press ABORT Soft Function Key F6 (4) to escape without saving Setup.

Pressing RCL Memory Key allows the operator to recall up to 50 previously stored operation screens. RF Receive, RF Generate or Duplex Operation Screen configurations can all be accessed from the RF Generate Operation Screen. Accessing anything other than an RF Generate Operation Screen configuration, automatically switches the COM-120B to the selected mode of operation.

RECALL Operation for the RF Receive Operation is as follows:



1. Press RECALL MEMORY Key.

2. Enter Setup # (1) value. Range is 0 to 49. Press ENTER Key.

3. Press RESTORE Soft Function Key F1 (5) to accept selections and recall Setup. Press ABORT Soft Function Key F6 (4) to escape without recalling Setup.

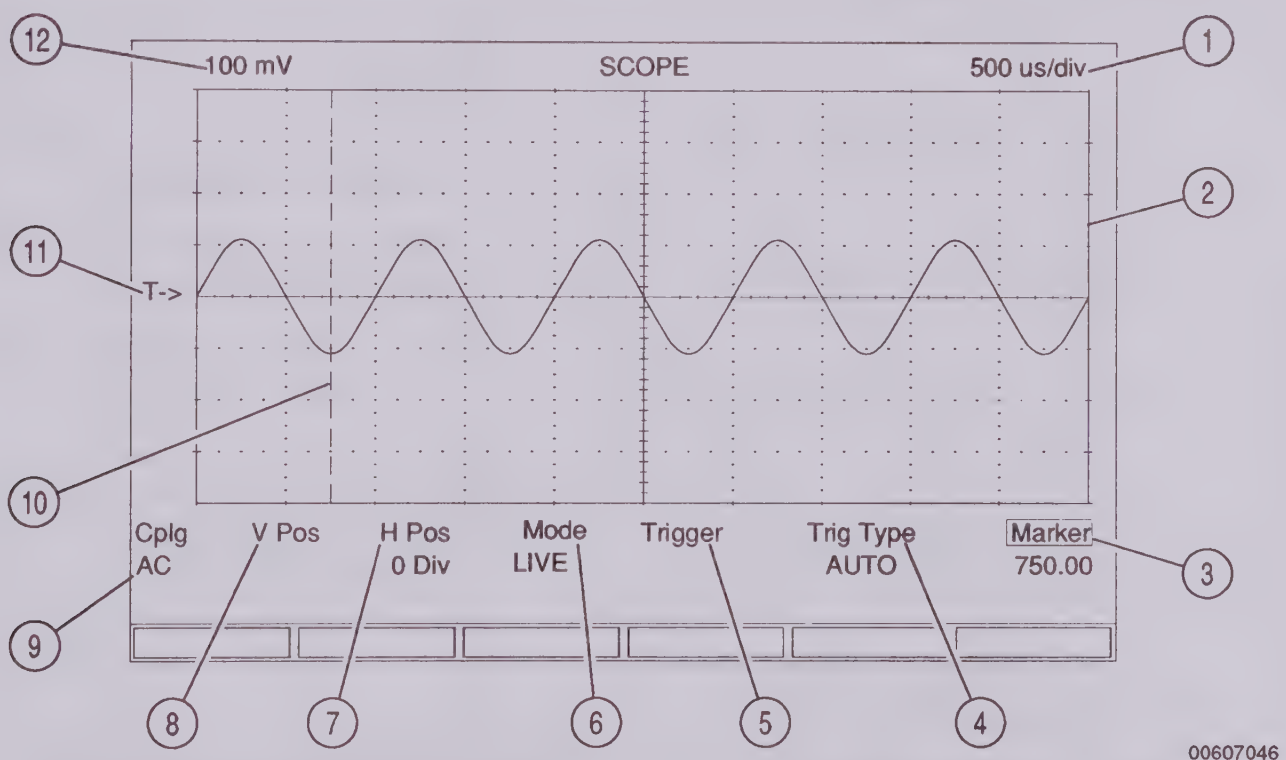
4. Type (3) displays the type of data saved in the specified setup number. Types to save and recall are: DUPLEX, GENERATOR, RECEIVER, GENERATOR & RECEIVER and EMPTY.

5. Press RESTORE Soft Function Key F1 (5) to accept selections and save Setup. Press ABORT Soft Function Key F6 (4) to escape without recalling Setup.

4-5 OSCILLOSCOPE OPERATION SCREEN

Pressing the SCOPE INSTRUMENTS Key accesses the Oscilloscope Operation Screen. The purpose of the Independent Oscilloscope is to provide a test instrument that is independent of the other Operation Modes. What this section does is provide information for configuring the Oscilloscope in a generic sense. It is provided to explain how the active fields are edited and what selections are available. It is not designed to perform a specific test, but instead is provided as a reference for configuring the Independent Oscilloscope Operation Screen.

Configure and operate the Independent Oscilloscope Operation Screen as follows:



1. Select Sweep (1). Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

- Press ROLL Soft Function Key F2 to view the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.
- Press SLOW Soft Function Key F2 to return to the normal mode of operation.

2. Select Trigger Type (4) as follows:
   - Press NORM Soft Function Key F1 to select Normalized Trigger.
   - Press AUTO Soft Function Key F2 to select Auto Trigger.
   - Press 1 SHOT Soft Function Key F3 to select One Shot Trigger. Press 1 SHOT Soft Function Key F3 as needed to reset Trigger.
3. Set Trigger Level (11) as follows:
   - Move cursor to Trigger (5).

- Press ENTER Key.
- Use DATA SCROLL Spinner or DATA SCROLL Keys to set Trigger.
- Press ENTER Key to complete edit.

4. Select Operation Mode (6) as follows:
   - Press MENU Soft Function Key F1 to access Operation Mode menu selections.
     - Press LIVE Soft Function Key F1 to select Live Operation Mode.
     - Press RECALL Soft Function Key F2 to select Recall Operation Mode.
     - Press COMPARE Soft Function Key F3 to select Compare Operation Mode.
     - Press LIVE-REF Soft Function Key F4 to select Live-Ref Operation Mode.
     - Press REF-LIVE Soft Function Key F5 to select Ref-Live Operation Mode.
     - Press RETURN Soft Function Key F6 to exit to Scope Operation.
   - Press AVG Soft Function Key F2 to select Average Operation Mode.
   - Press PK HOLD Soft Function Key F3 to select Peak Hold Operation Mode.
   - Press MIN HOLD Soft Function Key F4 to select Minimum Hold Operation Mode.
   - Press STORE Soft Function Key F6 to store the current trace.
5. Select H POS (7) Offset as needed. Range is -10 to 10 Divisions.
6. Set Vertical Position of trace as needed by accessing V POS (8) and editing with DATA SCROLL Keys or DATA SCROLL Spinner.
7. Select Coupling (9). Selections include GND (Ground), AC and DC. Select as follows:
   - Press GND Soft Function Key F1 to select GND as Coupling (9).
   - Press AC Soft Function Key F2 to select AC as Coupling (9).
   - Press DC Soft Function Key F3 to select DC as Coupling (9).
8. Select Oscilloscope Scale (12). Selections available are dependent on Scope Source (4). Selections include:

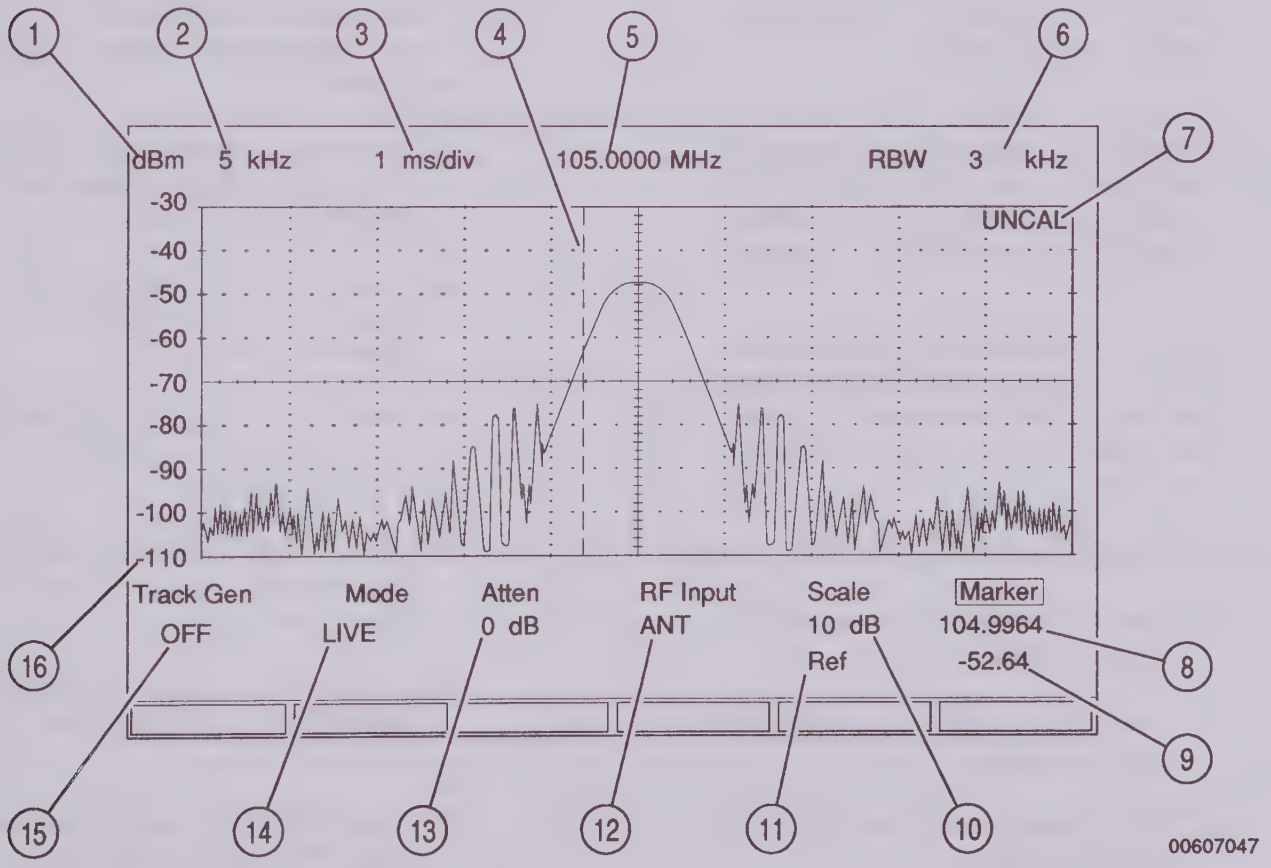
10 mV	20 mV	50 mV
100 mV	200 mV	500 mV
1 V	2 V	5 V
10 V	20 V	50 V

9. Activate Marker (10), as required, as follows:
   - With Cursor on Marker Position (3), press On/Off Soft Function Key F1.
   - Enter Desired Marker Position using DATA ENTRY Keys or DATA SCROLL Keys and/or DATA SCROLL Spinner.

4-6 SPECTRUM ANALYZER OPERATION SCREEN

Pressing the ANLYZ INSTRUMENTS Key accesses the Spectrum Analyzer Operation Screen. The purpose of the Independent Spectrum Analyzer is to provide a test instrument that is independent of the Operation Modes. What this section does is provide information in configuring the Spectrum Analyzer in a generic sense. It is provided to explain how the active fields are edited and what selections are available. It is not designed to perform a specific test, but instead is provided as a reference for configuring the Independent Spectrum Analyzer Operation Screen.

Configure and operate the Independent Spectrum Analyzer Operation Screen as follows:



1. Set Center Frequency (5). Press Set Ref Soft Function Key F1 if current Center Frequency is to be used as Reference Frequency. Press Split Soft Function Key F5 If Split Screen Operation is desired. If Find Function Operation is desired, configure as follows:

   - Press Config Soft Function Key F4 to access Sweep Width Window. Enter Sweep Width. Press highlighted Config Soft Function Key F4 to close Window.

- Press Find Lvl Soft Function Key F3 to activate Marker for setting Find Level Reference. Use DATA SCROLL Spinner or DATA SCROLL Keys to edit Marker Level. Press Highlighted Find Lvl Soft Function Key F3 to complete operation.

- Press Find Soft Function Key F2 to activate Find Function.

2. Select Scan Width (2). Selections include zero scan and:

1 kHz	2 kHz	5 kHz
10 kHz	20 kHz	50 kHz
100 kHz	200 kHz	500 kHz
1 MHz	2 MHz	5 MHz
10 MHz	20 MHz	50 MHz
100 MHz		

The word "UNCAL" appears in the display when combinations of RBW, frequency span and sweep rate for which the analyzer is not calibrated are used.

3. Set Logarithmic Function (1) as follows:

- Press dBm Soft Function Key F1 to select dBm.

- Press dBµV Soft Function Key F2 to select dBµV.

- Press dBmV Soft Function Key F3 to select dBmV.

- Press dBV Soft Function Key F4 to select dBV.

- Press dBµW Soft Function Key F5 to select dBµW.

- Press dBW Soft Function Key F6 to select dBW.

4. Set Scale (10) as follows:

- Press 10 dB Soft Function Key F1 to select 10 dB for Vertical Scale (15).

- Press 2 dB Soft Function Key F2 to select 2 dB for Vertical Scale (13).

5. Select Mode (14) as follows:

- Press MENU Soft Function Key F1 to access Operation Mode menu selections.

  - Press LIVE Soft Function Key F1 to select Live Operation Mode.

  - Press RECALL Soft Function Key F2 to select Recall Operation Mode.

  - Press COMPARE Soft Function Key F3 to select Compare Operation Mode.

  - Press LIVE-REF Soft Function Key F4 to select Live-Ref Operation Mode.

  - Press REF-LIVE Soft Function Key F5 to select Ref-Live Operation Mode.

  - Press RETURN Soft Function Key F6 to exit to Analyzer Operation.

- Press AVG Soft Function Key F2 to select Average Operation Mode.

- Press PK HOLD Soft Function Key F3 to select Peak Hold Operation Mode.

- Press MIN HOLD Soft Function Key F4 to select Minimum Hold Operation Mode.

- Press STORE Soft Function Key F6 to store the current trace.

6. Activate Marker (4), as required, as follows:

   - With Cursor on Marker Position (8), press On/Off Soft Function Key F1.

   - Enter Desired Marker Position using DATA ENTRY Keys or DATA SCROLL Keys and/or DATA SCROLL Spinner.

7. Access Ref (11) Field to adjust Vertical Scale (14), as needed.

8. Select RF Input (12) as needed.

   - Press T/R Soft Function Key F1 to select T/R Connector.

   - Press ANT Soft Function Key F2 to select ANT Connector.

9. Select Attenuation (13) as needed.

   - Press 30 dB Soft Function Key F1 to select 30 dB Attenuation.

   - Press 0 dB Soft Function Key F2 to select 0 dB Attenuation.

10. Scan Sweep Selections Include:

200 µs/div	500 µs/div	1 ms/div
2 ms/div	5 ms/div	10 ms/div
20 ms/div	50 ms/div	100 ms/div
200 ms/div	500 ms/div	

4-7 AUDIO/DATA/SIGNALING GENERATORS

Pressing the AUDIO GEN INSTRUMENTS Key accesses the Independent Audio/Data/ Signaling Generators Operation Screen. The purpose of the Independent Audio/Data/ Signaling Generators is to provide baseband signal generators that are independent of the other Operation Modes. This section provides information on configuring the Audio/Data/Signaling Generators in the COM-120B. Configuring the Audio/Data/ Signaling Generators is covered in a generic sense. It is provided to explain how each of the active fields are edited and what selections are available. It is not designed to perform a specific test, but instead is provided as a reference.

The Audio/Data/Signaling Generators Operation Screen is composed of four sections, each of which represents a different generator. These generators are covered separately. Restrictions that apply to the generators are primarily related to the output level. The sum of the generators output level should not exceed 2.5 volts in X1 mode and 25 mV in /10 (divide by 10) mode. If /10 mode is selected, ALL signal generators are affected:

Audio Generator 1 Operation

Audio Generator 2 Operation

DATA Generator Operation

DTMF Generator Operation

- Press C-MSG Soft Function Key F2 to set Bandpass Filter (11) to C-Message Weighted Filter (*C-MSG*).

12. Set Scope Scale (18). Selections change depending on selected Source (1). Selections include:

Source (1)	Scale
RF POW	LOW (2 mW to 20 mW signal) MED (>20 mW to 2 W signal) HIGH (>2 W to 200 W signal
AUD/DAT or EXT MOD	100, 200, 500 mV 1, 2, 5 V
SC/DVM	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V

13. Set Scope Sweep (19). Selections include:

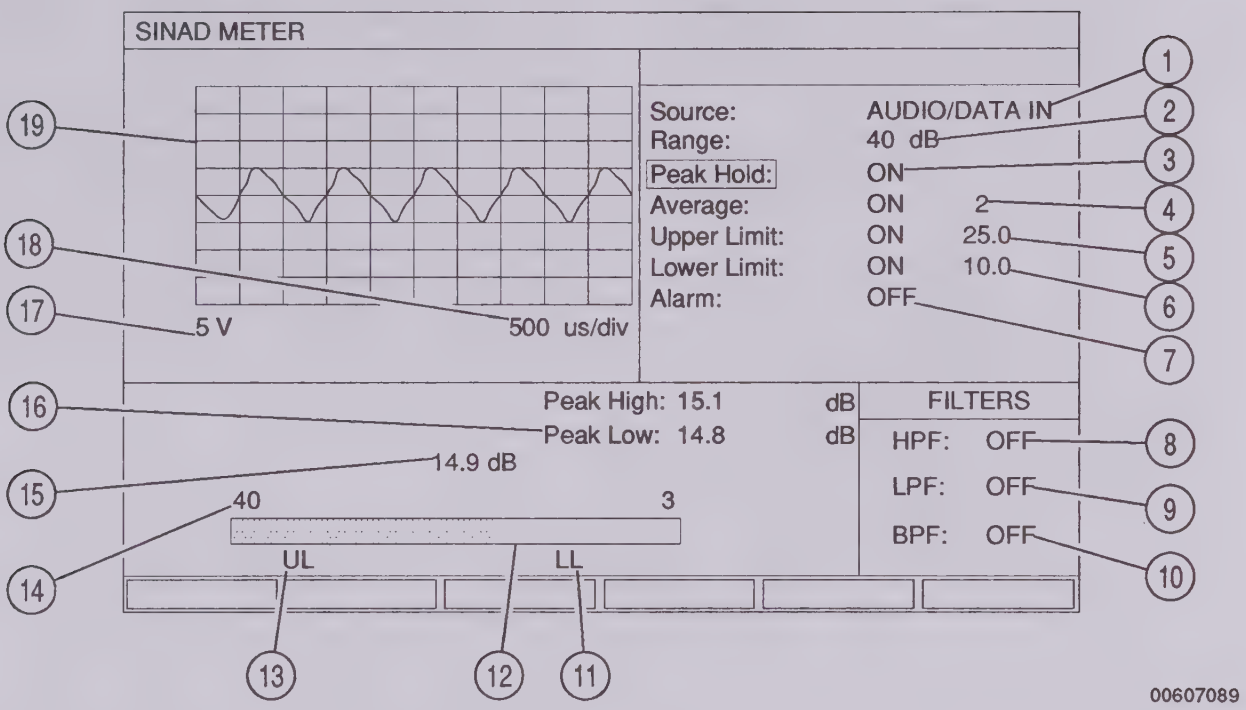
100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

- Press ROLL Soft Function Key F2 to view the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.

- Press SLOW Soft Function Key F2 to return to the normal mode of operation.

4-8-2 SINAD METER OPERATION

Configure and operate SINAD Meter as follows:



1. Select Source (1) as follows:

   - Press AUD/DAT Soft Function Key F1 to select AUDIO/DATA IN Connector as Source (1).
   - Press SC/DVM Soft Function Key F2 to select SCOPE/DVM Connector as Source (1).

2. Select Range (2) as follows:

   - Press 15 dB Soft Function Key F1 to select 15 dB as Range (2).
   - Press 40 dB Soft Function Key F2 to select 40 dB as Range (2).
   - Press AUTO Soft Function Key F3 to select Autorange for Range (2).

3. If Peak Hold Function is desired, do not select Autorange. Configure as follows:

   - With cursor on Peak Hold (3), press OFF/ON Soft Function Key F1 until Peak Hold (3) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (3) displays ***OFF***.

4. If Average Function is desired, configure as follows:

   - With cursor on Average (4), press OFF/ON Soft Function Key F1 until Average (4) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (4) displays ***OFF***.

5. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (5), press OFF/ON Soft Function Key F1 until Upper Limit (5) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 40.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (5) displays ***OFF***.

6. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (6), press OFF/ON Soft Function Key F1 until Lower Limit (6) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 40.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (6) displays ***OFF***.

7. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (7), press OFF/ON Soft Function Key F1 until Alarm (7) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (7) displays ***OFF***.

8. Set High-Pass Filter (8) as follows:

   - Press OFF Soft Function Key F1 to set High-Pass Filter (8) to ***OFF***.
   - Press 300 Hz Soft Function Key F2 to set High-Pass Filter (8) to ***300 Hz***.
   - Press 4 kHz Soft Function Key F3 to set High-Pass Filter (8) to ***4 kHz***.

9. Set Low-Pass Filter (9) as follows:

   - Press OFF Soft Function Key F1 to set Low-Pass Filter (9) to ***OFF***.
   - Press 300 Hz Soft Function Key F2 to set Low-Pass Filter (9) to ***300 Hz***.
   - Press 4 kHz Soft Function Key F3 to set Low-Pass Filter (9) to ***4 kHz***.
   - Press 20 kHz Soft Function Key F4 to set Low-Pass Filter (9) to ***20 kHz***.

10. Set Bandpass Filter (10) as follows:

    - Press OFF Soft Function Key F1 to set Bandpass Filter (10) to ***OFF***.
    - Press C-MSG Soft Function Key F2 to set Bandpass Filter (10) to C-Message Weighted Filter (***C-MSG***).

11. Set Scope Scale (12). Selections change depending on selected Source (1). Selections include:

Source (1)	Scale
AUD/DAT	100, 200, 500 mV 1, 2, 5 V
SC/DVM	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div

12. Set Scope Sweep (18). Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

- Press ROLL Soft Function Key F2 to view the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.

- Press SLOW Soft Function Key F2 to return to the normal mode of operation.

5-3 MANDATORY IEEE 488.2 COMMANDS

Mnemonic	Command
*CLS	Clear Status Command
*ESE X	Standard Event Status Enable, x = 0 to 255
*ESE?	Standard Event Status Enable Query
*ESR?	Standard Event Status Register Query
*IDN?	Identification Query
*OPC	Operation Complete Command
*OPC?	Operation Complete Query
*OPT?	Returns Software Option of Test Set
*RST	Restart Command
*SRE X	Service Request Command, x = 0 to 255
*SRE?	Service Request Enable Query
*STB?	Read Status Byte Query
*TST?	Self Test Query
*WAI	Wait-To-Continue Command

Mandatory GPIB Commands

5-4 COM-120B SPECIFIC COMMANDS

The following list of commands is broken up by function. All string values must be entered within Quotation marks (" "). Within the list, the commands are listed in hierarchal order. Each hierarchy is separated by a colon(:). For example, the command "RECeiver:INPut:ATTenuation 30" is listed as follows:

```
R ECeiver
   :INPut
      :ATTenuation v                                  Set input ATTenuation.
```

The v is a variable parameter. At least one space is required between commands and parameters. When more than one parameter is required, they are separated by a comma (,). The example given is a command to set the COM-120B. Another type of command used is a Query Command. Query Commands contain a question mark (?) at the end of the command and before any parameters.

Commands are listed in upper and lower case letters. This is to identify the short and long form of the command. The upper case letters identify the short form of the command. The upper and lower case letters, together, identify the long form of the command.

ANALYZER COMMANDS

NOTE1: Assumed units are MHz. Valid units are Hz, kHz, MHz or GHz. Accepted frequency range is from 250 kHz through 1 GHz in 0.1 kHz steps.

ANALyzer		
:ADJust		Adjusts vertical scale using internal -40 dB reference signal.
:BANDwidth v[units]		Sets the Resolution Bandwidth of the analyzer. v may be: 300 Hz, 3 kHz, 30 kHz, 300 kHz or 3 MHz. [units] may be Hz, kHz, or MHz. The default is Hz.
:DEFault		Sets the Resolution Bandwidth to the default value for the current analyzer SPAN-width.
:RESolution v[units]		Identical to BAND. Included for SCPI standard.
:BANDwidth?		Returns the current analyzer Resolution Bandwidth.
:FIND		
:INITiate		Starts Find function.
:LEVel v	0 to 255	Sets Find level in pixels. Top of Screen is 255.
:LEVel?		Queries Find level.
:SWEep		
:WIDth v	.2000 to 500.0000	Sets Find sweep width in MHz with .0001 MHz increments.
:WIDth?		Returns sweep width in MHz.
:FREQuency v[units]	.0000 to 1000.0000	Sets Center Frequency . See Note 1.
:FREQuency?		Queries Center Frequency.
:INPut		
:ANTenna		Sets ANTENNA Connector as input.
:ATTenuation v	0 or 30	Sets input ATTenuation in dB.
:ATTenuation?		Queries input ATTenuation.
:TR		Sets T/R Connector as input.
:INPut?		Queries selected input connector.
:MARKer		
:AMPLitude?		Queries level at active marker location.

ANALyzer		
:MARKer		
:FREQuency v[units]		Sets marker frequency. Range of value is dependent on scan width. Marker frequency must be in displayed frequency window. See Note 1.
:FREQuency?		Queries Marker Frequency.
:STATe b	0 or 1	Sets Marker to ON or OFF.
:STATe?		Queries Marker state.
:MODE	AVERage	Sets Mode to Average.
	COMPare	Sets Mode to Compare.
	LIVE	Sets Mode to Live.
	LMINus	Live minus (i.e. Reference-Live).
	MINhold	Sets Mode to Min Hold.
	PEAKhold	Sets Mode to Peakhold.
	RECAll	Recalls stored trace.
	RMINus	Reference minus (i.e. Live-Reference).
	STORe	Stores current trace in memory.
:MODE?		Queries Mode Type.
:REFerence		
:LEVel v		Sets Reference Level. Range is dependent on Scale. Range is 0 to 2 in 10 dB mode. Range is 0 to 64 in 2 dB mode.
:LEVel?		Queries Reference Level.
:SCALe v	2 or 10	Sets Scale in dB.
:UNITs	DBM	Sets Scale Units to dBm.
	DBW	Sets Scale Units to dBW.
	DBMV	Sets Scale Units to dBmV.
	DBUV	Sets Scale Units to dBµV.
	DBUW	Sets Scale Units to dBµW.
	DBV	Sets Scale Units to dBV.
:UNITs?		Queries Units selected.
:SCALe?		Returns Scale value.
:SPAN v[units]	1, 2, 5, 10, 20, 50,	Sets Spanwidth. Assumed units are kHz.
:SPAN	100, 200, 500 kHz,	Accepted units are kHz and MHz.
	1, 2, 5, 10, 20,	
	50, 100 MHz	
:DEFault		Sets the Sweep Rate and Resolution Bandwidth to the default values for the current SPAN-width.
:SPAN?		Returns Spanwidth value and units.
:SPLIT		Sets the analyzer to Split-mode of operation. Only applies to independent analyzer. Does not update screen.
:NORMAL		Sets the analyzer to Normal-mode of operation. Only applies to independent analyzer. Does not update screen.
:SWEEP v[units]		Sets the analyzer sweep rate per division. v may be: 200 µs, 500 µs, 1 ms, 2 ms, 5 ms, 10 ms, 20 ms, 50 ms, 100 ms, 200 ms, or 500 ms. [units] may be: microseconds or milliseconds. Microseconds is the default.
:TIME v[units]		Identical to SWEEP. Included for SCPI standard.
:DEFault		Sets the Sweep Rate to the default value for the current analyzer SPAN-width.
:SWEEP?		Returns the current analyzer sweep rate.
:TRACe		
:DATA?[v1,v2,v3]		Queries current data trace values. v1 specifies Mode (0[live], 1[recall], 2[peakhold]). v2 specifies start point in pixels, with range of 0 to 499. v3 specifies number of returned points in pixels with range of 0 to 499, where v1 + v2 ®500. Defaults are 0,0,500.

ANALyzer		
:TRACKgen b	0 or 1	Sets Tracking Generator to ON or OFF. Requires Option 12.
:LEVel v	-130 to +13 dBm	Sets Tracking Generator level in dBm.
:LEVel?		Queries Tracking Generator level.
:TRACKgen?		Queries Tracking Generator state.

BER COMMANDS

Refer to Measure Commands for initiating BER Meter operation and obtaining data. Send SYST:KEY:STOP command to halt BER Meter operation.

BER		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm status.
:BAUD v	75, 150, 300, 600, 1200, 2400, 4800, 9600	Sets baud rate of data transfer.
:BAUD?		Queries baud rate for data transfer.
:COUPling	AC or DC	Sets coupling for input signal.
:COUPling?		Queries Coupling status.
:FM		
:RANGe v[units]	10, 20, 50, 100	Sets Deviation Range in kHz.
:RANGe?		Queries Deviation Range.
:INPut	AUDIN	Sets Input to Audio Data In.
	DEMODulation	Sets input to demodulated signal.
:INPut?		Queries input setting.
:MODE		
:CONTinuous		Sets BER Meter to loop continuously.
:LOOP v	1 to 100000	Sets BER Meter to loop for specified number of tests.
:LOOP?		Queries number of loops for LOOP Mode.
:MODE?		Queries Mode type.
:OUTPut	AUDOUT	Sets output to AUDIO/DATA GEN Connector.
	GENerator	Sets output to RF Generator.
:OUTPut?		Queries output destination.
:PATTern	FIXed	Sets Data Pattern to Fixed.
	RANDom	Sets Data Pattern to Random.
:PATTern?		Queries Data Pattern type.
:PEAKhold		
:MAXimum?		Queries Maximum Peak Hold value.
:RESet		Resets Peak Hold function.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF
:STATe?		Queries Peak Hold setting.
:POLarity	INVerted	Sets Data Polarity to Inverted.
	NORmal	Sets Data Polarity to Normal.
:POLarity?		Queries DAta Polarity.
:SIZE v	128 to 100000	Sets size of data word in bits.
:SIZE?		Queries data word size.
:UPPer v1,v2		Sets Upper Limit to value defined as v1 EXP - v2. Range of v1 is 0 to 999. Range of v2 is 3 to 6.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
BER		
:UPPer?		Queries Upper Limit values.

DECODER COMMANDS

DECode		
:FORMat	EEA	Set DECode format for desired decode format.
	EIA	
	ZVEI	
	DZVei	
	DDZVei	
	CCIR	
	CCIRH	
	CCIRH4	
	NATel	
	EURo	
	TONE5_6	
	USER	
	DTMF	
	DCS	
	DCSINVerted	
	POCSag	
	POCInv	
:POCSag		
:BAUD v	512, 1200, 2400	Sets POCSAG receive baud rate.
:BAUD?		Queries POCSAG receive baud rate.
:BAUD		
:AUTO		Sets the POCSAG receive baud rate to Auto baud rate detect (1200 or 2400).
:MESSage?		Queries ASCII decode string. DCS and DCSINV are returned in SCPI #Q Octal format.

DISPLAY COMMANDS

The DISPlay subsystem changes the screen. Fields on the current display are updated as they are changed. New screens are displayed with this command.

DISPlay?		Queries current screen number.
DISPlay		
:ANALyzer		Displays independent Spectrum Analyzer.
:BER		Displays BER Meter.
:DUPLex		
:GENerator		No parameter for GEN screen.
	DISTortion	Displays dependent Distortion Meter.
	AFLevel	Displays AF Level Meter.
	SINad	Displays dependent SINAD Meter.
	SCOPe	Displays dependent Oscilloscope.
	ANALyzer	Displays dependent Analyzer.
:RECeiver		Displays Duplex Receive Operation Screen when no parameter is used.
	LEVel	Displays dependent Received Level Meter.
	MODulation	Displays Modulation Meter if demod is AM, Deviation Meter if demod is FM, Phase Meter if demod is PM.
	DISTortion	Displays dependent Distortion Meter.
	AFCounter	Displays dependent AF Counter.
	POWer	Displays RF Power Meter.
	SINad	Displays dependent SINAD Meter.
	SCOPe	Displays dependent Oscilloscope.
	ANALyzer	Displays dependent Spectrum Analyzer.
	RFERror	Displays RF Error Meter.
:RECGen		Displays Duplex Screen.

DISPlay		
:FGENerator		Displays Audio/Data/Signal Generators
:GENerator		Displays RF Generate Operation Screen when no parameter is used.
	DISTortion	Displays dependent Distortion Meter.
	AFLevel	Displays AF Level Meter.
	SINad	Displays dependent SINAD Meter.
	SCOPe	Displays dependent Oscilloscope.
	ANALyzer	Displays dependent Analyzer.
:METers	DISTortion	Displays Independant Distortion Meter.
	SINad	Displays Independant SINAD Meter.
	AFCounter	Displays Independant AF Counter.
	DVM	Displays Independant DVM.
:RECeiver		Displays RF Receive Operation Screen when no parameter is used.
	LEVel	Displays dependent Received Level Meter.
	MODulation	Displays Modulation Meter same as Duplex Receiver.
	DISTortion	Displays dependent Distortion Meter.
	AFCounter	Displays dependent AF Counter.
	POWer	Displays RF Powe Meter.
	SINad	Displays dependent SINAD Meter.
	SCOPe	Displays dependent Oscilloscope.
	ANALyzer	Displays dependent Spectrum Analyzer.
	RFERror	Displays RF Error Meter.
:SCOPe		Displays independent Oscilloscope.
:SETup		Displays Setup Menu.
:TRUNKing	RADIOSimulation	Displays LTR Radio Simulator Screen.
	REPeater	Displays LTR Repeater Simulator Screen.
	AUXSetup	Displays LTR Auxiliary Setup Screen,

DUPLEX COMMANDS

DUPLex		
:LOCK b	0 or 1	Sets Offset Lock to OFF and ON.
:LOCK?		Queries Offset Lock state.
:OFFSet v[units]	.2500 to 1000.0000	Sets offset frequency. Assumed units are MHz. Valid units are Hz, kHz, MHz or GHz.
:RECAll v	0 to 49	Restores duplex screen values from specified storage location.
:STORe v	0 to 49	Stores current settings at specified location.
:LABel v,string	0 to 49	Attaches character string (0 to 8 characters) to specified storage location.
:LABel? v	0 to 49	Queries LABel for specified storage location.

FILTER COMMANDS

FILTer		
:SPEaker OFF		Sets Speaker Operation to OFF.
:BANDwidth		
:CMESsage		Sets Filter to C-Message Weighted Filter.
:WIDE		Sets Filter to Wideband.
:AUDio		Sets Internal Modulation as Speaker source. Valid only on Generate and Receive Operation Screens.
:SPEaker?		Queries current Speaker setting.
:MODMeter		
:HPASs v[units]	0, 300, 4000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.

FILTer		
:MODMeter		
:HPASs?		Queries Filter setting.
:BPASs	OFF	Sets Filter to OFF.
	CMESsage	Sets Filter to C-Message Weighted Filter.
:BPASs?		Queries Filter setting.
:LPASs v[units]	0, 300, 4000, 20000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:LPASs?		Queries Filter setting.
:AFDecode		
:HPASs v[units]	0, 300, 4000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:HPASs?		Queries Filter setting.
:BPASs	OFF	Sets Filter to OFF.
	CMESsage	Sets Filter to C-Message Weighted Filter.
:BPASs?		Queries Filter setting.
:LPASs v[units]	0, 300, 4000, 20000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:LPASs?		Queries Filter setting.
:AFCounter		
:HPASs v[units]	0, 300, 4000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:HPASs?		Queries Filter setting.
:BPASs	OFF	Sets Filter to OFF.
	CMESsage	Sets Filter to C-Message Weighted Filter.
:BPASs?		Queries Filter setting.
:LPASs v[units]	0, 300, 4000, 20000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:LPASs?		Queries Filter setting.
:DATADecode		
:HPASs v[units]	0, 300, 4000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:HPASs?		Queries Filter setting.
:BPASs	OFF	Sets Filter to OFF.
	CMESsage	Sets Filter to C-Message Weighted Filter.
:BPASs?		Queries Filter setting.
:LPASs v[units]	0, 300, 4000, 20000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:LPASs?		Queries Filter setting.
:CLEar		Sets all filters to OFF. Does not affect speaker.

FORMAT COMMANDS

The format commands set data formats for transferring numeric information. The data format for response data may override the definition of FORMat.

EXAMPLE: Floating point requirements always override a non-base10 FORMat.

FORMat type		
ASCii		Returns all data (including integers and real numbers) as an ASCII representation. Numbers are returned in base 10.
BINary		Returns data encoded as numeric base 2, preceded by #B. Example: 15 is #B1111.
HEXadecimal		Returns data encoded as numeric base 16, preceded by #H. Example: 255 is #HFF.
INTeger		Returns ONLY block data encoded as 8 bit binary data with header and checksum.
OCTal		Returns data encoded as numeric base 8, preceded by #Q. Example: 255 is #Q377.

FUNCTION GENERATOR COMMANDS

FGENerator		
:ATTenuation b	0 or 1	Turning Attenuation on activates divide-by-100 attenuator.
:ATTenuation?		Queries Attenuation state.
:DATA		
:CODe v	#Q0 to #Q777	Sets octal Code Value for DCS/ (DCS Inverted).
:CODe?		Queries DCS/DCS Inverted octal Code Value.
:FORMat	DCS	Sets DATA Format to DCS.
	INVDCS	Sets DATA Format to DCS Inverted.
	INVPOC	Sets DATA Format to POCSAG Inverted.
	POCSag	Sets DATA Format to POCSAG.
:FORMat?		Queries DATA Format.
:LEVel v		Sets output level for DATA Generator. Value is dependent on status of Attenuation. Value is 0 to 2.5 Vp if OFF and 0 to .250 Vp if ON.
:LEVel?		Queries DATA Generator LEVel.
:POCSag		
:BAUD v	512, 1200, 2400	Selects Baud rate for POCSAG Generation.
:BAUD?		Queries POCSAG Baud rate.
:CAPCode v1[,v2]	0 to 9999999	Sets capcode range. v1 corresponds to start value and v2 corresponds to end value. Start value must be ≤ end value.
:CAPCode?		Queries current pocsag capcode.
:ENCode		Activates POGSAG Generation.
:MODE	BEEP1	Sets POCSAG Mode to 1 Beep.
	BEEP2	Sets POCSAG Mode to 2 Beep.
	BEEP3	Sets POCSAG Mode to 3 Beep.
	BEEP4	Sets POCSAG Mode to 4 Beep.
	NUMeric	Sets POCSAG Mode to Numeric.
	NUMSeq	Sets POCSAG Mode to Numeric Sequence.
	ANUM	Sets POCSAG Mode to Alpha-Numeric.

FGENerator		
:DATA		
:POCSag		
:MODE	ANUM_LC	Sets POCSAG Mode to Alpha-Numeric lower case.
	ANUM_UC	Sets POCSAG Mode to Alpha-Numeric upper case.
	ANUM_SPec	Sets POCSAG Mode to Alpha-Numeric special characters.
:MODE?		Queries POCSAG Mode.
:STATe b	0 or 1	Sets DATA Generator to ON or OFF.
:STATe?		Queries DATA Generator status.
:DTMF		
:CODe string		Sets DTMF Code where string is code.
:CODe?		Queries DTMF Code.
:ENCode		Starts DTMF burst message.
:LEVel v		Sets output level for DTMF Generator. Value is dependent on status of Attenuation. Value is 0 to 2.5 Vp if OFF and 0 to .250 Vp if ON.
:LEVel?		Queries DTMF Generator LEVel.
:MARK v	25 to 999	Sets Mark Time in ms.
:MARK?		Queries Mark Time.
:MODE	CONTinuous	Sets operation to continuous generation.
	BURSt	Sets operation to single burst.
:MODE?		Returns operation mode.
:PAUSe v	25 to 999	Sets Pause Time in ms.
:PAUSe?		Queries Pause Time.
:SPACe v	25 to 999	Sets Space Time in ms.
:SPACe?		Queries Space Time.
:STATe b	0 or 1	Sets DTMF Generator to ON or OFF.
:STATe?		Queries DTMF Generator status.
:GEN1		
:ENCode		Issues burst message of current format.
:FORMat		
:EEA string	0-9, A, G, R	Sets EEA Format with Code set to string.
:EIA string	0-9, A, G, R	Sets EIA Format with Code set to string.
:ZVEI string	0-9, A, G, R	Sets ZVEI Format with Code set to string.
:DZVei string	0-9, A, G, R	Sets DZVEI Format with Code set to string.
:DDZVei string	0-9, A, G, R	Sets DDZVEI Format with Code set to string.
:CCIR string	0-9, A, G, R	Sets CCIR Format with Code set to string.
:CCIRH string	0-9, A, G, R	Sets CCIRH Format with Code set to string.
:CCIRH4 string	0-9, A, G, R	Sets CCIRH4 Format with Code set to string.
:NATel string	0-9, A, G, R	Sets NATEL Format with Code set to string.
:EURo string	0-9, A, G, R	Sets EURO Format with Code set to string.
:TONE5_6 string	0-9, A, G, R	Sets 5/6 TONE Format with Code set to string.
:USER string	0-9, A-T	Sets USER Format with Code set to string.
:TONE10ps string	0-9, A-D, #, *	Sets 10 PS Format with Code set to string.
:TONE20ps string	0-9, A-D, #, *	Sets 10 PS Format with Code set to string.
:MTS string	0-9, A-D, #, *	Sets MTS Format with Code set to string.
:IMTS string	0-9, A-D, #, *	Sets IMTS Format with Code set to string.
:TREM		Sets Tone Remote Format.
:TONe		Sets Tone Format.
:FORMat?		Queries current GEN1 format.
:FREQuency v		Sets GEN1 Frequency. Range of value is 5.0 to 20000.0 Hz for Sine Shape and Tone Format. 5.0 to 10000.0 Hz for other shapes and Tone Format. Selections for Tone remote are: 1950, 1850, 1350,1250, 2050, 1750, 1650,1550, 1450, 1150, or 1050 Hz.
:FREQuency?		Queries GEN1 frequency.
:LEVel v		Sets output level for Audio Generator 1. Value is dependent on status of Attenuation.

FGENerator		
:GEN1		
:LEVel?		Queries Audio Generator 1 LEVel. 0 to 2.5 Vp if OFF and 0 to .250 Vp if ON.
:MODE	CONTinuous	Sets mode for continous operation.
	BURSt	Initiates a burst of current format.
:MODE?		Queries mode.
:STATe b	0 or 1	Sets Audio Generator 1 to ON or OFF.
:STATe?		Queries Audio Generator 1 status.
:SHAPe	SINe	Sets Shape to Sine.
	SQUare	Sets Shape to Square.
	RAMP	Sets Shape to Ramp.
	TRIangle	Sets Shape to Triangle.
:SHAPe?		Queries Shape.
:TIMe v	0 to 32.000	Sets burst time for Tone format in seconds.
:TIMe?		Queries Tone burst time.
:USER "char",v1,v2		Sets User Codes. "char" is 0 to 9 or A to T enclosed in quotes. Code frequency (v1) is 0.0 to 9999 Hz. Duration (v2) is 0.000 to 9.999 seconds.
:USER? "char"		Returns frequency and duration of specified code.
:GEN2		
:FREQuency v		Sets GEN2 Frequency. Range of value is 5.0 to 20000.0 Hz for Sine Shape and 5.0 to 10000.0 Hz for other shapes. Requires Option 04 for frequency other than 1000.0 Hz.
:FREQuency?		Queries Frequency.
:LEVel v		Sets output level for Audio Generator 2. Value is dependent on status of Attenuation. Value is 0 to 2.5 Vp if OFF and 0 to .250 Vp if ON.
:LEVel?		Queries Audio Generator 2 LEVel.
:SHAPe	SINe	Sets Shape to Sine.
	SQUare	Sets Shape to Square. Requires Option 04.
	RAMP	Sets Shape to Ramp. Requires Option 04.
	TRIangle	Sets Shape to Triangle. Requires Option 04.
:SHAPe?		Queries Shape.
:STATe b	0 or 1	Sets Audio Generator 2 to ON or OFF.
:STATe?		Queries Audio Generator 2 status.

GENERATOR COMMANDS

NOTE1: Set frequency to value. Assumed units are MHz. Valid optional units are Hz, kHz, MHz or GHz. Frequency range is from 0.0 to 1000.0000 MHz.

NOTE2: Set output level in DBM, uV, mV or V. Assumed units are dBm. Ranges are as follows:

UNITS	T/R	AUX w/o 20dB AMP	AUX w/20dBm AMP
DBM	-130 to -20	-130 to -13	-130 to 13
uV	0 to 999.9	0 to 999.9	0 to 999.9

UNITS	T/R	AUX w/o 20dB AMP	AUX w/20dBm AMP
mV	0 to 22.3	0 to 50.5	0 to 999.9
V	0 to 0.022	0 to 0.050	0 to 0.988

NOTE3: Cannot have FM and PM modulation chosen on two different function generator devices.

NOTE4: Must set the "MODE" before using this command.

GENerator		
:FREQuency v[units]	0.0 to 1000.0000	See NOTE 1.
:CELLular v	1 to 1023	Sets Cellular channel. See NOTE 4.
:CELLular?		Queries current Cellular channel.
:LIST v	0 to 99	Sets frequency list value. Refer to NOTE 4.
:FREQuency v1,v2[units]	0 to 99, 0.0 to 1000.0000	Sets frequency list value (v1) to frequency (v2). See NOTE 1.
:FREQuency? v	0 to 99	Queries frequency of specified frequency list value.
:LABel v,string	0 to 99	Attaches character string (®6 characters) to specified frequency list value.
:LABel? v	0 to 99	Queries LABel for specified frequency list value.
:LIST?		Queries frequency list value.
:MODE		
:CELLular	FORward	Sets cellular forward channel as MODE Type.
	REVerse	Sets cellular reverse channel as MODE Type.
:FIXed		Sets frequency as MODE Type.
:LIST		Sets Frequency LIST as MODE Type.
:TRUNKing	FORward	Sets trunking forward channel as MODE Type.
	REVerse	Sets trunking reverse channel as MODE Type.
:MODE?		Returns current MODE.
:TRUNKing v1,v2	1 to 760, 800 or 900	Sets Trunking Channel in specified band. See NOTE 4.
:TRUNKing?		Queries Trunking Channel.
:FREQuency?		Returns frequency in MHz.
:METer		
:ANALyzer		Sets Spectrum Analyzer on RF Generate Operation Screen.
:DISTortion		Sets Distortion Meter on RF Generate Operation Screen.
:SCOPe		Sets Oscilloscope on RF Generate Operation Screen.

GENerator		
:METer		
:SINad		Sets SINAD Meter on RF Generate Operation Screen.
:OUTPut		
:AUX		Sets AUX RF OUT Connector as output.
:DATA		
:AM		
[:MODulation]	0% to 100%	Sets AM Modulation Level.
[:MODulation]?		Queries AM Modulation Level.
:FM		
[:DEViation] v	0.0 to 100.0	Sets FM Deviation in kHz.
[:DEViation]?		Queries FM Deviation.
:MODulation	AM	Sets Modulation Type to AM.
	FM	Sets Modulation Type to FM. See NOTE 3.
	OFF	Sets Modulation Type to OFF.
	PM	Sets Modulation Type to PM. See NOTE 3.
:MODulation?		Queries Modulation Type.
:PM		
[:DEViation] v	0.0 to 10.0	Sets PM Deviation in Radians.
: [:DEViation]?		Queries PM Deviation.
:DTMF		
:AM		
[:MODulation]	0% to 100%	Sets AM Modulation Level.
[:MODulation]?		Queries AM Modulation Level.
:FM		
[:DEViation] v	0.0 to 100.0	Sets FM Deviation in kHz.
[:DEViation]?		Queries FM Deviation.
:MODulation	AM	Sets Modulation Type to AM.
	FM	Sets Modulation Type to FM. See NOTE 3.
	OFF	Sets Modulation Type to OFF.
	PM	Sets Modulation Type to PM. See NOTE 3.
:MODulation?		Queries Modulation Type.
:PM		
[:DEViation] v	0.0 to 10.0	Sets PM Deviation in Radians.
: [:DEViation]?		Queries PM Deviation.
:EXTernal		
:MODulation	AM	Sets Modulation Type to AM.
	FMNARR1	Sets Modulation Type to FM NAR 1. See NOTE 3.
	FMNARR2	Sets Modulation Type to FM NAR 2. See NOTE 3.
	FMNARR3	Sets Modulation Type to FM NAR 3. See NOTE 3.
	FMWIDE	Sets Modulation Type to FM WIDE. See NOTE 3.
	OFF	Sets Modulation Type to OFF.
	PMNARR1	Sets Modulation Type to PM NAR 1. See NOTE 3.
	PMNARR2	Sets Modulation Tyoe to PM NAR 2. See NOTE 3.
	PMNARR3	Sets Modulation Type to PM NAR 3. See NOTE 3.
:MODulation?		Queries Modulation Type.
:GATE	TR	Sets T/R Connector as output connector, as selected by MIC PTT switch.
	AUX	Sets AUX RF OUT Connector as output, as selected by MIC PTT switch.
:GEN1		
:AM		
[:MODulation]	0% to 100%	Sets AM Modulation Level.
[:MODulation]?		Queries AM Modulation Level.
:FM		
[:DEViation] v	0.0 to 100.0	Sets FM Deviation in kHz.
[:DEViation]?		Queries FM Deviation.

GENerator		
:OUTPut		
:GEN1		
:MODulation	AM	Sets Modulation Type to AM.
	FM	Sets Modulation Type to FM. See NOTE 3.
	OFF	Sets Modulation Type to OFF.
	PM	Sets Modulation Type to PM. See NOTE 3.
:MODulation?		Queries Modulation Type.
:PM		
[:DEViation] v	0.0 to 10.0	Sets PM Deviation in Radians.
: [:DEViation]?		Queries PM Deviation.
:GEN2		
:AM		
[:MODulation]	0% to 100%	Sets AM Modulation Level.
[:MODulation]?		Queries AM Modulation Level.
:FM		
[:DEViation] v	0.0 to 100.0	Sets FM Deviation in kHz.
[:DEViation]?		Queries FM Deviation.
:MODulation	AM	Sets Modulation Type to AM.
	FM	Sets Modulation Type to FM. See NOTE 3.
	OFF	Sets Modulation Type to OFF.
	PM	Sets Modulation Type to PM. See NOTE 3.
:MODulation?		Queries Modulation Type.
:PM		
[:DEViation] v	0.0 to 10.0	Sets PM Deviation in Radians.
: [:DEViation]?		Queries PM Deviation.
:LEVel v[units]		Sets Output level. See NOTE 2.
:LEVel?		Queries Output level.
:LEVel		
:UNITs	DBM	Sets UNITS for LEVel? command to dBm.
	UV	Sets UNITS for LEVel? command to μV.
	MV	Sets UNITS for LEVel? command to mV.
	V	Sets UNITS for LEVel? command to V.
:UNITs?		Queries UNITS Type.
:MIC		
:MODulation	AM	Sets Modulation Type to AM.
	FMNARR1	Sets Modulation Type to FM NAR 1. See NOTE 3.
	FMNARR2	Sets Modulation Type to FM NAR 2. See NOTE 3.
	FMNARR3	Sets Modulation Type to FM NAR 3. See NOTE 3.
	FMWIDE	Sets Modulation Type to FM WIDE. See NOTE 3.
	OFF	Sets Modulation Type to OFF.
	PMNARR1	Sets Modulation Type to PM NAR 1. See NOTE 3.
	PMNARR2	Sets Modulation Tyoe to PM NAR 2. See NOTE 3.
	PMNARR3	Sets Modulation Type to PM NAR 3. See NOTE 3.
:MODulation?		Queries Modulation Type.
:TR		Sets T/R Connector as output connector.
:OUTPut?		Queries selected output connector.
:RECAll v	0 to 49	Restore GENERATE Screen values from specified location.
:STORe v	0 to 49	Stores current screen locations at specified location.
:LABel v,string	0 to 49	Attaches character string (0 to 8 characters) to specified storage location.
:LABel? v	0 to 49	Queries LABel for storage location.

GENerator		
:SWEep		
:ABORt		Stops Sweep Function.
:CONTinuous		Sets Sweep Function to Continuous Operation. Use ABORt to halt.
:INCRement v	0.0001 to 1000.0000	Sets Increment Frequency in MHz.
:INCRement?		Queries Increment Frequency.
:PAUSe v	0.0 to 9.5	Sets Pause time for Sweep Function in 0.5 second increments.
:PAUSe?		Queries Pause time for Sweep Function.
:ONCE		Sets Sweep Function for one pass. Use ABORt after pass.
:STARt v	0.0 to 1000.0000	Sets Start RF in MHz.
:STARt?		Queries Start RF.
:STOP v	0.0 to 1000.0000	Sets Stop RF in MHz.
:STOP?		Queries Stop RF.
:RESUme		Continue sweeping where stopped or continue sweeping if in squelch mode.
:FREQuency?		Return current Sweep Function frequency in MHz.
:SWEep?		Queries Sweep Function Status. Returns 0 if off.

MEASURING COMMANDS

MEASure	Commands require specified meter be active.
:SINad?	Queries SINAD Meter reading.
:FM	
:NEG?	Returns the Negative peak FM Deviation Meter reading.
:POS?	Returns the Positive peak FM Deviation Meter reading.
:FM?	Returns +/- peak div by 2 FM Deviation Meter reading.
:PM	
:NEG?	Returns the Negative peak FM Deviation Meter reading.
:POS?	Returns the Positive peak FM Deviation Meter reading.
:PM?	Queries PM Deviation Meter reading.
:AM?	Queries AM Modulation Meter reading.
:RECLevel?	Queries Received Level Meter reading.
:AFCounter?	Queries AF Counter reading. Return value resolution is .1 Hz if input frequency is <500 Hz or gatetime is 10 sec. Otherwise resolution is 1 Hz.
:POWer?	Queries Power Meter reading.
:DVM?	Queries DVM reading.
:DISTortion?	Queries Distortion Meter reading.
:RFERror?	Queries RF ERROR Meter reading and input frequency. Resolution is 1 Hz if gatetime is 1 sec. Otherwise, resolution is 10 Hz.
:AFLevel?	Queries AF Level Meter reading.
:BER?	Initiates BER Meter, then queries BER Meter reading. BER Meter reading as string consists of mantissa, "EXP" and exponent.
INITiate	Initiates measurement of slow meters. SRQ indicates completion, if SRQ mask for meter is enabled.
:AFCounter	Starts AF Counter Measurement.
:RFERror	Starts RF Error Meter Measurement.
:BER	Starts BER Meter Measurement.
:TRUNKing	Starts next trunking decode.

FETCh		Returns value(s) created by INIT command, or error code -230.
:AFCounter?		Queries AF Counter reading.
:RFERror?		Queries RF ERROR Meter reading and input frequency. Resolution is 1 Hz if gatetime is 1 sec. Otherwise, resolution is 10 Hz.
:BER?		Queries BER Meter reading. BER Meter reading as string consists of mantissa, "EXP" and exponent.
:TRUNKing?		Returns decoded trunking data.

METER COMMANDS

METer		
:SINad		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:INPut	AUDIN	Sets input to AUDIO/DATA IN Connector.
	SCOPedvm	Sets Input to SCOP/DVM Connector.
:SINad		
:INPut?		Queries Input setting.
:LOWer v	0.0 to 40.0	Sets Lower Limit values in dB.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	15 or 40	Sets display range in dB.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UPPer v	0.0 to 40.0	Sets Upper Limit value in dB.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:FM		
[:DEViation]		
:ADJust		Performs FM-Z.
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:COUPLing	AC	Set Meter for AC Coupled operation.
	DC	Set Meter for DC Coupled operation.
:COUPLing?		

METer		
:FM		
[:DEViation]		
:LOWer v	0.0 to 99.99	Sets Lower Limit values in kHz.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	2, 5, 10, 50, 100	Sets display range in kHz. Hz are also acceptable units.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UPPer v	0.0 to 99.99	Sets Upper Limit value in kHz.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
[:MODE]		
:NORMal		Reads Deviation +/- peak div by 2.
:BOTH		Reads Positive and Negative Deviation.
[:MODE?]		Returns Deviation Meter Mode.
:PM		
[:DEViation]		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:LOWer v	0.0 to 9.99	Sets Lower Limit values in Radians.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	1, 2, 5, 10	Sets display range in Radians.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UPPer v	0.0 to 9.99	Sets Upper Limit value in Radians.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
[:MODE]		
:NORMal		Reads Deviation +/- peak div by 2.
:BOTH		Reads Positive and Negative Deviation.
[:MODE?]		Returns Deviation Meter Mode.
:AM		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.

METer		
:AM		
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:LOWer v	0.0% to 99.9%	Sets Lower Limit values.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
LOWer v	0.0% to 99.9%	Sets Lower Limit values.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:AM		
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	40% or 100%	Sets display range.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UPPer v	0.0% to 99.9%	Sets Upper Limit value.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:RECLevel		
:ADJust		Performs runtime adjustment. Requires external connection between ANTENNA Connector and T/R Connector for valid adjustment.
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 75	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:RECLevel		
:LOWer v		Sets Lower Limit values. Range of value is dependent on Receiver Attenuation and Units. If REC:INP:ATT is set to 30 dB, range is -80 to 0 dBm or 22.3 to 223606 µV. If REC:INP:ATT is set to 0 dB, range is -110 to -30 dBm or 0 to 70710 µV.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:UNITs	DBM	Sets units for meter to dBm.
	UV	Sets units for meter to µV.
:UNITs?		Return the units.

METer		
:AFCounter		
:ALARm		
:UPPer v		Sets Upper Limit values. Range of value is dependent on Receiver Attenuation and Units. If REC:INP:ATT is set to 30 dB, range is -80 to 0 dBm or 22.3 to 223606 µV. If REC:INP:ATT is set to 0 dB, range is -110 to -30 dBm or 0 to 70710 µV.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:GATE		
:TIME v	1 or 10	Sets Gate Time in seconds.
:TIME?		Queries Gate Time.
:INPut	AUDIN	Sets AF Counter Input to AUDIO/DATA IN Connector.
	RFPower	Sets AF Counter Input to RF Power line.
	EXTMod	Sets AF Counter Input to EXT MOD Connector.
	SCOPedvm	Sets AF Counter Input to SCOPE/DVM Connector.
:INPut?		Queries meter Input.
:LOWer v	0.0 to 20000.0	Sets Lower Limit values in Hz.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:AFCounter		
:RANGe v[units]	200, 2000, 20000	Sets display range. Assumed units are Hz, If kHz is specified, values are 0.2, 2 and 20.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UPPer v	0.0 to 20000.0	Sets Upper Limit value in Hz.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:AFLevel		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:IMPedance v	0 to 1000	Specify input impedance of user signal.
:IMPedance?		Queries impedance.
:LOWer v	0.00 to 10.00	Sets Lower Limit values in V.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.

METer		
:AFLevel		
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	.05, .1, .2, .5, 1, 2, 5, 10	Sets display range. Assumed units are V, allowed units are mV and V.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UNITs	DBM	Sets units for meter to dBm.
	VRMS	Sets units for meter to Vrms.
	DB	Sets units for meter to dB.
:UNITs?		Queries units setting.
:UPPer v	0.00 to 10.00	Sets Upper Limit value in V.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:POWer		
:ADJust		Zeroes Power Meter. Requires Power applied to T/R Connector be removed.
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 75	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:LOSS v	-9.9 to 9.9	Sets Cable Loss in dB.
:LOSS?		Queries Cable Loss value.
:LOWer v	0.0000 to 200.0000	Sets Lower Limit values in W.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:POWer		
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	.002, .005, .01, .02, .05, .1, .2, .5, 1, 2, 5, 10, 20, 50, 100,200	Sets display range. Assumed units are W, allowed units are mW and W.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UNITs	DBM	Sets units for meter to dBm.
	W	Sets units for meter to W.
:UNITs?		Queries units setting.
:UPPer v	0.0000 to 200.0000	Sets Upper Limit value in W.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:DVM		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.

METer		
:DVM		
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:IMPedance v	2 to 1000	Specifies input impedance of user signal.
:IMPedance?		Queries impedance.
:INPut	AC	Sets meter input to ac coupled SCOPE/DVM
:INPut?		Queries DVM Meter input.
		Connector.
	AUDIN	Sets meter input to AUDIO/DATA IN Connector.
	DC	Sets meter input to dc coupled SCOPE/DVM Connector.
	EXTMod	Sets meter input to EXT MOD Connector.
	GROund	Sets meter input to GND coupled SCOPE/DVM Connector.
:LOWer v	0.000 to 200.000	Sets Lower Limit values in V.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	.05, .1, .2, .5, 1, 2	Sets display range. Assumed units are V,
	5, 10, 20, 50, 100, 200	allowed units are mV and V.
:RANGe?		Queries Range.
:UNITs	DBM	Sets units for meter to dBm.
	VRMS	Sets units for meter to Vrms.
	DB	Sets units for meter to dB.
:UNITs?		Queries units setting.
:UPPer v	0.000 to 200.000	Sets Upper Limit value in V.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:DISTortion		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:INPut	AUDIN	Sets meter input to AUDIO/DATA IN Connector.
:INPut?	SCOPedvm	Sets meter input to SCOPE/DVM Connector.
		Queries Distortion Meter input.
:LOWer v	0.0% to 20.0%	Sets Lower Limit values.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.

METer		
:DISTortion		
:UPPer v	0.0% to 20.0%	Sets Upper Limit value.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:RFERror		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:GATE		
:TIME v	0.1 or 1.0	Sets Gate Time in seconds.
:TIME?		Queries Gate Time.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	.1, 1, 10, 100	Sets display range. Assumed units are kHz, allowed units are Hz and kHz.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UPPer v	0.0 to 100000.0	Sets Upper Limit value in Hz.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.

RECEIVER COMMANDS

NOTE1: Set frequency to value. Assumed units are MHz. Valid optional units are Hz, kHz, MHz or GHz. Accepted frequency range is from 0.0000 through 1000.0000 MHz in 0.1 kHz steps.

NOTE2: Must set the "MODE" before using this command.

RECeiver		
:BANDwidth v[units]	3, 15, 30, 300	Sets Receiver IF Bandwidth in kHz. 3 kHz requires Option 8. 30 kHz requires Option 3.
:BANDwidth?		Queries IF Bandwidth.
:DEMODulation	AM	Sets Demodulation to AM.
	FM	Sets Demodulation to FM.
	LB	Sets Demodulation to Lower SSB. Requires Option 8.
	PM	Sets Demodulation to PM.
	UB	Sets Demodulation to Upper SSB. Requires Option 8.
:DEMODulation?		Queries Demodulation type.
:FREQuency v[units]	0.0000 to 1000.0000	See NOTE 1.
:CELLular v	1 to 1023	Sets Cellular channel. See NOTE 2.
:CELLular?		Queries current Cellular channel.
:LIST v	0 to 99	Sets frequency list value. See NOTE 2.
:FREQuency v1,v2[units]	0 to 99, 0.0000 to 1000.0000	Sets frequency list value (v1) to frequency (v2). See NOTE 1.
:FREQuency? v	0 to 99	Queries frequency of specified frequency list value.
:LABel v,string	0 to 99	Attaches character string (®6 characters) to specified frequency list value.
:LABel? v	0 to 99	Queries LABel for specified frequency list value.
:LIST?		Queries frequency list value.
:MODE		
:CELLular	FORward	Sets cellular forward channel as MODE Type.
	REVerse	Sets cellular reverse channel as MODE Type.
:FIXed		Sets frequency as MODE Type.
:LIST		Sets Frequency LIST as MODE Type.
:TRUNKing	FORward	Sets trunking forward channel as MODE Type.
	REVerse	Sets trunking reverse channel as MODE Type.
:MODE?		Returns current MODE.
:TRUNKing v1,v2	1 to 760, 800 or 900	Sets Trunking Channel in specified band. See NOTE 2.
:TRUNKing?		Queries Trunking Channel.
:FREQuency?		Returns frequency in MHz.
:INPut		
:ANTenna		Selects Antenna input connector.
:ATTenuation v	0, 30	Sets input ATTenuation in dB.
:ATTenuation?		Returns input ATTenuation in dB.
:TR		Selects TR input connector.
:INPut?		Returns selected input connector.
[:METer]		
:ANALyzer		Sets Spectrum Analyzer on RF Receive Operation Screen.
:DEViation		Sets appropriate Modulation/Deviation Meter on RF Receive Operation Screen.
:DISTortion		Sets Distortion Meter on RF Receive Operation Screen.

SCOPe		
:MODE	AVERage	Sets Mode to Average.
	COMPare	Sets Mode to Compare.
	LIVE	Sets Mode to LIVE.
	RECAll	Recalls stored trace.
	STORe	Stores current trace in memory.
:MODE?		Queries Mode Type.
:SCALe v[units]		Sets Vertical Scale. Default units are V. Valid units are V and mV. Values include; 10, 20, 50, 100, 200, 500 mV, 1, 2, 5, 10, 20 and 50 V.
:SCALe?		Returns vertical scale with units.
:SWEep[:TIME] v[units]		Sets duration of sweep per division. Assumed units are ms. Valid units are µs (US) and ms (MS). Accepted values are 100, 200, 500 µs, 1, 2, 5, 10, 20, 50 and 100 ms.
:SWEep[:TIME]?		Returns SWEep setting with units.
:TRACe		
:DATA?[v1,v2,v3]		Queries current data trace values. v1 specifies Mode (0[live], 1[recall]). v2 specifies start point in pixels, with range of 0 to 499. v3 specifies number of returned points in pixels with range of 0 to 499, where v1 + v2 ®500. Defaults are 0,0,500.
:TRIGger		
:ARM		Arms Trigger for Singleshot Mode.
:LEVel v	0 to 255	Sets trigger level.
:LEVel?		Queries trigger level.
:MODE	AUTO	Sets Trigger Mode to automatic.
	SINGleshot	Sets Trigger Mode to Singleshot.
	NORMal	Sets Trigger Mode to Normaiized.
:MODE?		Queries Trigger Mode setting.

STATUS COMMANDS

See Status Bit definitions and SCPI manuals for further descriptions.

STATus	
:OPERation	
:CONDition?	Returns operation condition register.
:ENABle v	Sets enable mask in event register.
:ENABle?	Returns state of event register's enable bit.
:EVENt?	Returns, then clears operation's event register.
:INSTrument	
:CONDition?	Queries Operation complete status-1.
:EBIT	Sets extension bits.
:CONDition?	Returns operation complete status-2.
:ENABle v	Sets enable mask in INST EBIT EVENt register.
:ENABle?	Queries enable mask in INST EBIT EVENt register.
:EVENt?	Queries INSTrument EBIT EVENt register.
:ENABle v	Sets enable mask in INSTrument EVENt register.
:ENABle?	Queries enable mask in INSTrument EVENt register.
:EVENt?	Queries INSTrument EVENt register.
:MEASuring	
:CONDition?	Returns operation measuring status-1.

STATus		
:OPERation		
:MEASuring		
:EBIT		
:CONDition?		Returns operation measuring status-2.
:ENABle v		Set enable mask in MEAS EBIT EVENt register.
:MEASuring		
:ENABle?		Queries enable mask in MEAS EBIT EVENt register.
:EVENt?		Queries MEAS EBIT EVENt register.
:ENABle v		Sets enable mask in MEAS EVENt register.
:ENABle?		Queries enable mask in MEAS EVENt register.
:EVENt?		Queries MEAS EVENt register.
:PRESet		Initializes enable and transition filter registers for SCPI mandated data structures.
:QUEStionable		
:CONDition?		Queries QUEST CONDition register.
:ENABle v		Sets enable mask in QUES EVENt register.
:ENABle?		Queries enable mask in QUES EVENt register.
:EVENt?		Queries QUEST EVENt register.
:INSTrument		
:CONDition?		Returns questionable status-1.
:EBIT		
:CONDition?		Returns questionable status-2.
:ENABle v		Sets enable mask in QUES INST EBIT EVENt register.
:ENABle?		Queries enable mask in QUES INST EBIT EVENt register.
:EVENt?		Queries QUES INST EBIT EVENt register.
:ENABle v		Sets enable mask in QUES INST EVENt register.
:ENABle?		Queries enable mask in QUES INST EVENt register.
:EVENt?		Queries QUES INST EVENt register.

SYSTEM COMMANDS

SYSTem		
:ERRor?		Returns error code + error message. Refer to para 5-5 for codes/messages.
:VERSion?		Returns version of SCPI used.
:KEY v		Sends keycode to execute. Refer to para 5-6 for definitions.
:STARt		Sends start key.
:STOP	Sends stop key.	
:KEY?		Returns key pressed or -1 if none.
:KLOCk b	0 = off, 1 = on	OFF enables front panel keyboard usage. SYST:SEC OFF must be sent before setting this command to OFF. ON disables front panel keyboard.
:KLOCk?		Returns keyboard lock state.
:COMMunicate		
:SERial		
:BAUD v	110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400	Sets Baud rate.
:BAUD?		Queries Baud rate.
:PARity xxx	EVEN, ODD, NONE	Sets Data Parity.
:PARity?		Queries Parity.
:BITS v	7 or 8	Sets Data Bits.
:BITS?		Queries Data Bits.

SYSTem		
:COMMunicate		
:SERial		
:SBITs v	1 or 2	Sets Stop Bits.
:SBITS?		Queries Stop Bits.
:PACE	XON, NONE	Sets XON/XOFF handshake control.
:PACE?		Queries XON/XOFF handshake control.
:CONTrol:		
RTS xxx	ON, STANdard, RFR	Sets hardware handshake control.
RTS?		Queries hardware handshake control.
:ECHO b	0 = off, 1 = on	Sets RCI ECHO on/off.
:ECHO?		Returns RCI ECHO state.
:GPIB		
:ADDRess v	1 to 30	Sets GPIB Address.
:DATE v,v,v		Sets numeric year, month and day.
:DATE?		Query numeric year, month and day.
:DEFault		Resets all unit settings to factory defaults.
:TIME v,v,v		Sets numeric hour, minute and second.
:TIME?		Query numeric hour, minute and second.
:SECurity		Refer to SCPI Volume 1 manual.
[:STATe] b	0 = off, 1 = on	Sets SECurity STATe.
[:STATe]?		
:SECurity?		

TRUNKING COMMANDS

These commands require Option 14, CLEARCHANNEL LTR® be installed.

TRUNKing		
:BORDer v	0 or 1	Sets Border Offset to DISABLED or ENABLED.
:BORDer?		Queries Border Offset state.
:FREEChan v	1 to 760	Sets Free Repeater channel number.
:FREEChan?		Queries Free Repeater channel number.
:RADIOSimulation		
:CHANnel v	1 to 760	Sets Channel Number for testing.
:CHANnel?		Queries Channel Number.
:BAND	800 or 900	Sets Bandwidth in MHz.
:BAND?		Queries Bandwidth.
:AREA b	0 or 1	Sets Area Bit ON or OFF.
:AREA?		Queries Area Bit setting.
:INUSe v	0 to 31	Sets Inuse Number.
:INUSe?		Queries Inuse Number.
:HOME v	0 to 31	Sets Home Repeater Number
:HOME?		Queries Home Repeater Number.
:GROUP v	0 to 255	Sets Group Number.
:GROUP?		Queries Group Number.
:FREE v	0 to 31	Sets Free Repeater Number.
:FREE?		Queries Free Repeater Number.
:ENCode		Starts Test.
:REPeater		
:MODE	FREE	Sets Mode to Free Home Repeater.
	BUSY	Sets Mode to Busy Home Repeater.
:MODE?		Queries simulation mode type.
:CHANnel v	1 to 760	Sets Channel Number for testing.
:CHANnel?		Queries Channel Number.
:BAND	800 or 900	Sets Bandwidth in MHz.
:BAND?		Queries Bandwidth.
:AREA b	0 or 1	Sets Area Bit ON or OFF.

TRUNKing		
:REPeater		
:AREA?		Queries Area Bit setting.
:GOTO v	0 to 31	Sets Goto Number.
:GOTO?		Queries Goto Number.
:HOME v	0 to 31	Sets Home Repeater Number
:HOME?		Queries Home Repeater Number.
:GROUP v	0 to 255	Sets Group Number.
:GROUP?		Queries Group Number.
:FREE v	0 to 31	Sets Free Repeater Number.
:FREE?		Queries Free Repeater Number.
:ENCode		Starts Test.
:RICGroup v	1 to 250	Sets Radio RIC ID.
:RICGroup?		Queries Radio RIC ID.
:SYNC v	#H0 TO #H1FF	Sets System Sync value.
:SYNC?		Queries System Sync value.

The **DELAY** command delays for 2 seconds to allow time for the DCS Code generation

TPAUSE
This command passes command execution to the next macro any Test Set activity in the schedule queue.

6-16 SYSTEM RS-232 CONFIGURE COMMANDS

The following commands allow the Test Set to control another device using serial RS-232 communication. Commands unique to the device controlled are sent as strings. Responses are received as strings.

SYSTem:PTHRough:SERial *"string"*
Passes the *string* through the RS-232 Connector.

SYSTem:PTHRough:SERial?
Waits for and returns a string from the RS-232 Connector.

SYSTem:PTHRough:SERial:QUEue?
Returns a non-zero value if data is in the RS-232 queue, 0 if the RS-232 queue is empty.

SYSTem:PTHRough:SERial:KEY?
Waits for and returns one character from the RS-232 Connector.

SYSTem:DEFault
Resets all unit settings to factory defaults with these exceptions: 1) All RCI macros are defined, 2) Any currently executing RCI macro continues to execute and 3) All stored setups, stored frequency lists and stored scope/analyzer traces are not affected.

NOTE: Communications parameters reset to default values! If this command is issued via RS-232 or GPIB, follow the command on the same line with instructions to restore communications with the host.

Example: SYST:SEC OFF
SYST:DEFAULT;:SYST:COMM:SER:BAUD 38400

6-17 SETUP COMMANDS

SETUP commands establish the routings for various Operation Modes without displaying the Operation Screens on the CRT. The SETUP commands force the COM-120B to switch to page 1 (a blank screen) but performs all the hardware setups.

SETUP:ANALyzer
Configures for independent Spectrum Analyzer.

SETUP:BER
Configures for the BER meter.

SETUP:DUPlex:GENerator
Configures for the Duplex Generator Operation.

SETUP:DUPlex:GENerator DISTortion
Configures for the Dependent Distortion Meter Operation.

SETUP:DUPlex:GENerator AFLevel
Configures for the AF Level Meter Operation.

SETUP:DUPlex:GENerator SINad
Configures for the Dependent SINAD Meter Operation.

SETUP:DUPlex:GENerator SCOPe
Configures for the Dependent Oscilloscope Operation.

SETUP:DUPlex:GENerator ANALyzer
Configures for the Dependent Spectrum Analyzer Operation.

SETUP:DUPlex:RECeiver
Configures for the Duplex Receiver Operation.

SETUP:DUPlex:RECeiver LEVel
Configures for the Dependent Received Level Meter.

SETUP:DUPlex:RECeiver MODulation
Configures for the Modulation Meter.

SETUP:DUPlex:RECeiver DISTortion
Configures for the Dependent Distortion Meter.

SETUP:DUPlex:RECeiver AFCounter
Configures for the Dependent AF Meter.

SETUP:DUPlex:RECeiver POWer
Configures for the Power Meter.

SETUP:DUPlex:RECeiver SINad
Configures for the Dependent SINAD Meter.

SETUP:DUPlex:RECeiver SCOPe
Configures for the Dependent Oscilloscope.

SETUP:DUPlex:RECeiver ANALyzer
Configures for the Dependent Spectrum Analyzer Operation.

SETUP:DUPlex:RFERror
Configures for the Frequency Error Meter.

SETUP:DUPlex:RECGen
Configures for the Duplex Operation.

SETUP:FGENerator
Configures for the Audio/Data/Signal Generators.

SETUP:GENerator
Configures for the Generator Operation.

SETUP:GENerator DISTortion
Configures for the Dependent Distortion Meter Operation.

SETUP:GENerator AFLevel
Configures for the AF Level Meter Operation.

SETUP:GENerator SINad
Configures for the Dependent SINAD Meter.

SETUP:GENerator SCOPe
Configures for the Dependent Oscilloscope Operation.

SETUP:GENerator ANALyzer
Configures for the Dependent Spectrum Analyzer Operation.

SETUP:METers DISTortion
Configures for the Independent Distortion Meter Operation.

SETUP:METers SINad
Configures for the Independent SINAD Meter Operation.

SETUP:METers AFCounter
Configures for the Independent AF Counter Meter.

SETUP:METers DVM
Configures for the Independent DVM.

SETUP:RECeiver
Configures for the Receiver Screen Operation.

SETUP:RECeiver LEVel
Configures for the Dependent Received Level Meter.

SETUP:RECeiver MODulation
Configures for the Modulation Meter.

SETUP:RECeiver DISTortion
Configures for the Dependent Distortion Meter Operation.

SETUP:RECeiver AFCounter
Configures for the Dependent AF Counter Meter.

SETUP:RECeiver POWer
Configures for the Power Meter.

SETUP:RECeiver SINad
Configures for the Dependent SINAD Meter.

SETUP:RECeiver SCOPe
Configures for the Dependent Oscilloscope.

SETUP:RECeiver ANALyzer
Configures for the Dependent Spectrum Analyzer Operation.

SETUP:RECeiver RFERror
Configures for the RF Error Meter.

SETUP:SCOPe
Configures for the Independent Oscilloscope Operation.

SETUP:SETup
Configures for the Setup Menu.

SETUP:TRUNKing RADIOSimulation
Configures for the LTR® Radio Simulator Operation

SETUP:TRUNKing REPeater
Configures for the LTR® Repeater Simulator Operation.

SETUP:TRUNKing AUXSetup
Configures for the LTR® Auxillary Setup Operation.

SETUP:FLIST
Configures for the Frequency List Operation.

SETUP:STFList
Configures for the Stored Frequency List Operation.

6-18 DISPLAY COMMANDS

DISPLAY commands establish the routings for various Operation Modes and display the Operation Screens on the CRT.

DISPLAY:ANALyzer
Displays independent Spectrum Analyzer.

DISPLAY:BER
Displays the BER meter.

DISPLAY:DUPlex:GENerator
Displays the Duplex Generator Operation.

DISPLAY:DUPlex:GENerator DISTortion
Displays the Dependent Distortion Meter Operation.

DISPLAY:DUPlex:GENerator AFLevel
Displays the AF Level Meter Operation.

DISPLAY:DUPlex:GENerator SINad
Displays the Dependent SINAD Meter Operation.

DISPLAY:DUPlex:GENerator SCOPe
Displays the Dependent Oscilloscope Operation.

DISPLAY:DUPlex:GENerator ANALyzer
Displays the Dependent Spectrum Analyzer Operation.

DISPLAY:DUPlex:RECeiver
Displays the Duplex Receiver Operation.

DISPLAY:DUPlex:RECeiver LEVel
Displays the Dependent Received Level Meter.

DISPLAY:DUPlex:RECeiver MODulation
Displays the Modulation Meter.

DISPLAY:DUPlex:RECeiver DISTortion
Displays the Dependent Distortion Meter.

DISPLAY:DUPlex:RECeiver AFCounter
Displays for the Dependent AF Meter.

DISPLAY:DUPlex:RECeiver POWer
Displays the Power Meter.

DISPLAY:DUPlex:RECeiver SINad
Displays the Dependent SINAD Meter.

DISPLAY:DUPlex:RECeiver SCOPe
Displays the Dependent Oscilloscope.

DISPLAY:DUPlex:RECeiver ANALyzer
Displays the Dependent Spectrum Analyzer Operation.

DISPLAY:DUPlex:RFERror
Displays the Frequency Error Meter.

DISPLAY:DUPlex:RECGen
Displays the Duplex Operation.

DISPLAY:FGENerator
Displays the Audio/Data/Signal Generators.

DISPLAY:GENerator
Displays the Generator Operation.

DISPLAY:GENerator DISTortion
Displays the Dependent Distortion Meter Operation.

DISPLAY:GENerator AFLevel
Displays the AF Level Meter Operation.

DISPLAY:GENerator SINad
Displays the Dependent SINAD Meter.

DISPLAY:GENerator SCOPe
Displays the Dependent Oscilloscope Operation.

DISPLAY:GENerator ANALyzer
Displays the Dependent Spectrum Analyzer Operation.

DISPLAY:METers DISTortion
Displays the Independent Distortion Meter Operation.

DISPLAY:METers SINad
Displays the Independent SINAD Meter Operation.

DISPLAY:METers AFCounter
Displays the Independent AF Counter Meter.

DISPLAY:METers DVM
Displays the Independent DVM.

DISPLAY:RECeiver
Displays the Receiver Screen Operation.

DISPLAY:RECeiver LEVel
Displays the Dependent Received Level Meter.

DISPLAY:RECeiver MODulation
Displays the Modulation Meter.

DISPLAY:RECeiver DISTortion
Displays for the Dependent Distortion Meter Operation.

DISPLAY:RECeiver AFCounter
Displays the Dependent AF Counter Meter.

DISPLAY:RECeiver POWer
Displays the Power Meter.

DISPLAY:RECeiver SINad
Displays the Dependent SINAD Meter.

DISPLAY:RECeiver SCOPe
Displays the Dependent Oscilloscope.

DISPLAY:RECeiver ANALyzer
Displays the Dependent Spectrum Analyzer Operation.

DISPLAY:RECeiver RFERror
Displays the RF Error Meter.

DISPLAY:SCOPe
Displays the Independent Oscilloscope Operation.

DISPLAY:SETup
Displays the Setup Menu.

DISPLAY:TRUNKing RADIOSimulation
Displays the LTR® Radio Simulator Operation

DISPLAY:TRUNKing REPeater
Displays the LTR® Repeater Simulator Operation.

DISPLAY:TRUNKing AUXSetup
Displays the LTR® Auxillary Setup Operation.

DISPLAY:FLIST
Displays the Frequency List Operation.

DISPLAY:STFList
Displays the Stored Frequency List Operation.

DISPLAY:FLIST
Displays the Frequency List Screen.

DISPLAY:STFList
Displays the Stored Frequency List Operation Screen.

SECTION 7 - OPTIONS

7-1 INTERNAL BATTERY (OPTION 01)

Provides self-contained dc power when external ac or dc power is unavailable.

7-2 OVEN CRYSTAL OSCILLATOR FREQUENCY STANDARD (OPTION 02)

OCXO replaces the standard TCXO as system time base. Provides 0.01×10^{-6} accuracy.

7-3 30 kHz IF FILTER (OPTION 03)

Provides additional band limiting between 15 kHz and 300 kHz offered in standard set. Required for AMPS Mobile Station Test (Option 15).

7-4 VARIABLE AUDIO GENERATOR 2 (OPTION 04)

Replaces standard fixed 1 kHz Audio Generator with variable frequency Audio Generator. Optional Audio Generator has frequency range of 5 to 20000 Hz with sine wave shape and 5 to 10000 Hz with ramp, triangle and square wave shapes.

Optional Audio Generator 2 is available for use on the RF Generate, Duplex and Duplex Generate Operation Screens as a modulation source. Additionally, it is available for baseband output from the Audio/Data/ Signalling Generators Operation Screen.

7-5 GENERATE AMPLIFIER (OPTION 05)

The Generate Amplifier is an internal RF Amplifier providing 26 dB gain for AUX RF OUT Connector. With Option 05 installed, RF AUX OUT Connector output range is -130 to +13 dBm for all Operation Modes.

7-6 DATA GENERATOR/BIT ERROR RATE (BER) METER (OPTION 07)

7-6-1 BER METER DESCRIPTION

The BER Meter is accessed by first pressing SPCL TEST MODE Key and selecting the Bit Error Rate Test. The BER Meter is designed to be used in Baseband, RF Generate, RF Receive or Duplex Mode. The complexity of the BER Meter is best described in four separate sections.

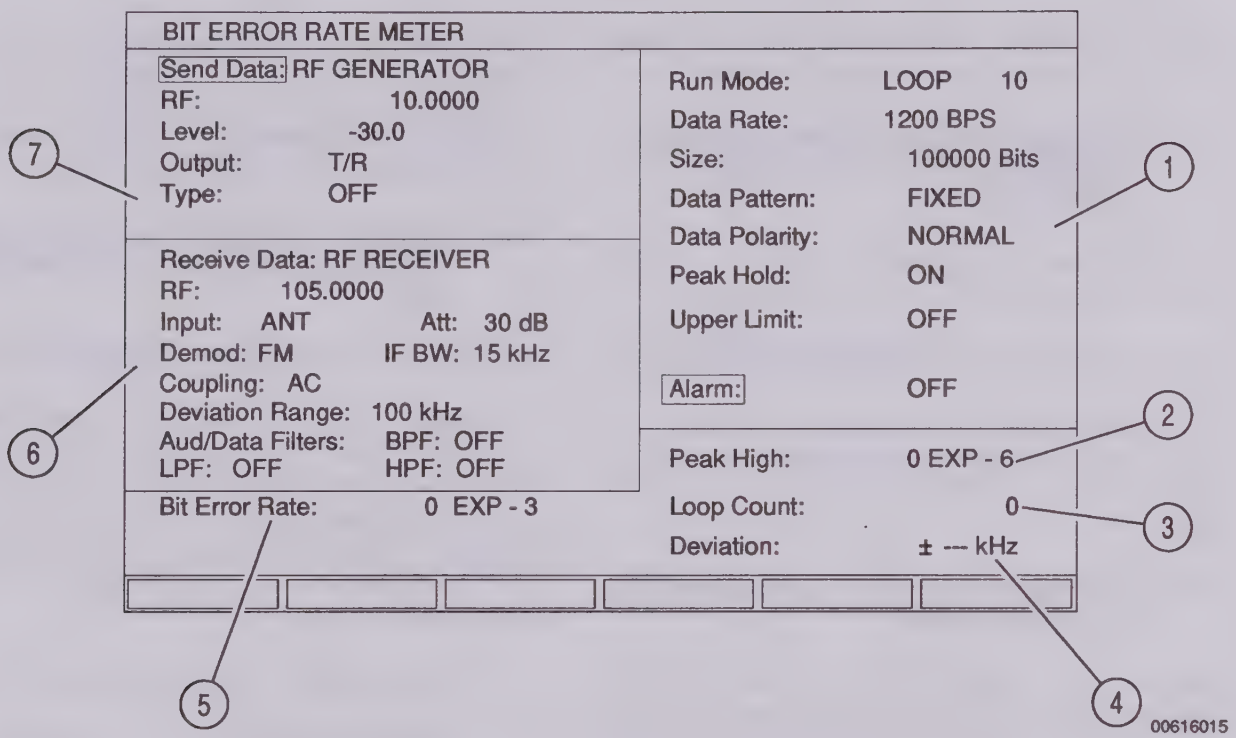
BER Meter General Operation Screen

BER Meter Configuration Section

Receive Data Configuration Section

Send Data Configuration Section

A. BER METER GENERAL OPERATION SCREEN



1. BER Meter Configuration Section

   Contains configuration data for signal.

2. Peak Reading

   Displays highest Bit Error Rate for current test.

3. Loop Count

   Displays number of times Data has been sent.

4. Input Level Indicator

   Displays the modulation or voltage level of the Receive Data input source. The level indicator displays an AF Level Meter reading when the field is set for AUDIO/DATA IN.

   When the field is set for RF RECEIVER, the Demod field determines the display (i.e., FM-Deviation Meter in kHz, AM-Modulation Meter in % or PM-Phase Meter in Rad).

5. Bit Error Rate

   Displays Bit Error Rate. Exponent changes depending on Data Pattern Size (11).

6. Receive Data Configuration Section

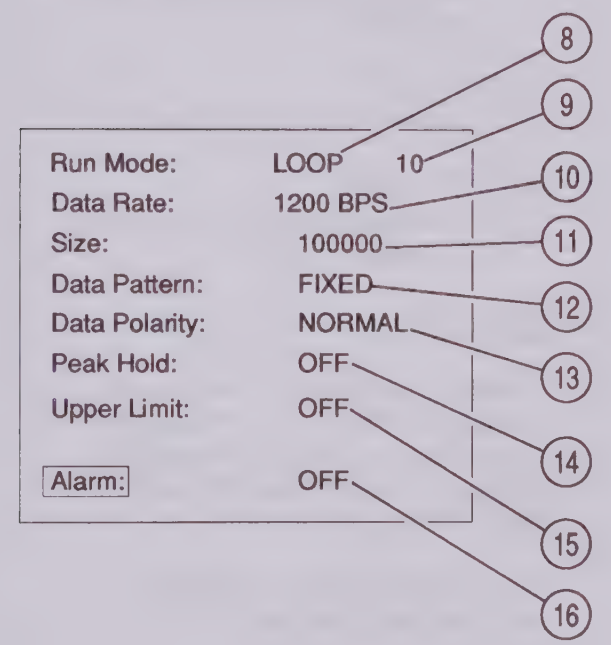
   Contains configuration data for Receive.

7. Send Data Configuration Section

   Contains configuration data for Generate Section.

B. BER METER CONFIGURATION SECTION

This section contains the parameters for setting the message size, rate and pattern as well as information on configuring the BER Meter. Functions and parameters for the BER Meter Configuration Section are as follows:



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8. Run Mode

Displays selected Operation Mode. Selections include Continuous (CONTIN.) and LOOP. When LOOP Mode is selected, LOOP Number (9) is displayed.

Soft Function Keys available with this function include

F1 CONTIN
Selects Continuous Run Mode.

F2 LOOP
Selects LOOp Run Mode.

F6 RETURN
Returns Operation to Special Test Menu.

9. LOOP Number

Displays selected number of Data Patterns to be Generated. Displayed only with LOOP selected for Run Mode (8). Range is 1 to 100000.

10. Data Rate

Displays selected Data Rate in Bits Per Second (BPS). Selections include:

75 BPS	150 BPS	300 BPS
600 BPS	1200 BPS	2400 BPS
4800 BPS	9600 BPS	

Soft Function Keys available with this function include:

F1 MENU
Accesses menu for selecting Data Rate.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

11. Data Pattern Size

Displays selected Data Pattern Size. Selections range from 128 to 100000 bits.

12. Data Pattern Type

Displays selected Data Pattern Type. Selections are RANDOM and FIXED.

FIXED is an 8 bit hexadecimal pattern that is repeated. RANDOM is based on a pseudorandom seed.

Soft Function Keys available with this function include:

F1 RANDOM
Selects RANDOM Data Pattern Type.

F2 FIXED
Selects FIXED Data Pattern Type.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

13. Data Polarity

Displays selected Data Polarity Type. Displays NORMAL or INVERTED. INVERTED is the opposite code of NORMAL.

Soft Function Keys available with this function include:

F1 NORMAL
Selects NORMAL Data Polarity.

F2 INVERTED
Selects INVERTED Data Polarity.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

Operation Mode. Selections include Continuous (CONTIN.) and LOOP. When LOOP Mode is selected, LOOP Number (2) is displayed.

14. Peak Hold

Displays selected Peak Hold Function Status. Status is OFF or ON. When ON, Peak Reading (2) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

15. Upper Limit

Displays selected Upper Limit. Status is OFF or ON. When ON Upper Limit Value is displayed. Range of Upper Limit Value is 0×10^{-6} to 999×10^{-3}.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

16. Alarm

Displays Alarm status. Status is OFF or ON. Alarm sounds when Upper Limit (15) is exceeded.

Soft Function Keys available with this function include:

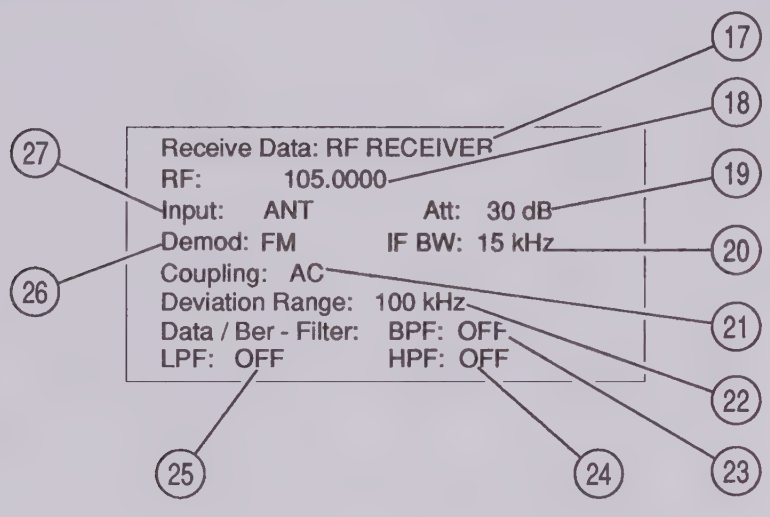
F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

C. RECEIVE DATA CONFIGURATION SECTION

This section contains the parameters for setting the Receiver Portion of the BER Meter. Functions and parameters for the Receiver portion of the BER Meter are as follows:



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17. Receive Data Input

Displays selected Input for BER Meter. Selections include RF RECEIVER and AUDIO DATA IN. Selecting RF RECEIVER means an RF Carrier is demodulated to receive the Data Signal. Selecting AUDIO DATA IN means Data Signal is received directly through the AUDIO/DATA IN Connector.

Soft Function Keys available with this function include:

F1 RF REC
Selects RF RECEIVER (either T/R or ANT ports) as BER Meter Input.

F2 DATA IN
Selects AUDIO DATA IN as BER Meter Input.

F6 RETURN
Returns Operation to Special Test Menu.

The following items are displayed only when RF RECEIVER is selected as Receive Data Input (17):

18. RF Field

Displays RF Receive Frequency. Selections range from .0000 to 1000 MHz.

19. Attenuation

Displays Input Attenuation. Selections are 0 or 30 dB.

Soft Function Keys available with this function include:

F1 30 dB
Selects 30 dB Input Attenuation.

F2 0 dB
Selects 0 dB Input Attenuation.

20. IF Bandwidth

Displays IF Filter Bandwidth. Selections are 300 and 15 kHz.

Soft Function Keys available with this function include:

F1 300 kHz
Selects 300 kHz IF Filter.

F2 15 kHz
Selects 15 kHz IF Filter.

21. Coupling

Displays Coupling Type for RF Receiver. Displayed only with FM selected for Demod Type (26). Selections are AC or DC.

Soft Function Keys available with this function include:

F1 AC
Selects AC Coupling.

F2 DC
Selects DC Coupling.

F5 FM-Z
Zeroes the FM Deviation Meter for proper readings.

F6 RETURN
Returns Operation to Special Test Menu.

22. Deviation Range

Displays FM Deviation Range. Displayed only with FM selected for Demod Type (26). Selections are 10, 20, 50 and 100 kHz.

Soft Function Keys available with this function include:

F1 10 kHz
Selects 10 kHz Deviation Range.

F2 20 kHz
Selects 20 kHz Deviation Range.

F3 50 kHz
Selects 50 kHz Deviation Range.

F4 100 kHz
Selects 100 kHz Deviation Range.

F6 RETURN
Returns Operation to Special Test Menu.

23. Bandpass Filter

Displays Bandpass Filter setting for demodulated signal. Selections include OFF and C-MSG (C-Message Weighted Filter).

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF.

F2 C-MSG
Activates C-Message Weighted Bandpass Filter.

24. High-Pass Filter

Displays current High-Pass Filter setting for demodulated signal. Selections include OFF, 300 Hz and 4 kHz.

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF.

F2 300 Hz
Activates 300 Hz High-Pass Filter.

F3 4 kHz
Activates 4 kHz High-Pass Filter.

25. Low-Pass Filter

Displays current Low-Pass Filter setting for demodulated signal. Selections include OFF, 300 Hz, 4 kHz and 20 kHz.

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF.

F2 300 Hz
Activates 300 Hz Low-Pass Filter.

F3 4 kHz
Activates 4 kHz Low-Pass Filter.

F4 20 kHz
Activates 20 kHz Low-Pass Filter

26. Demod Type

Displays Demodulation Type. Selections include FM, AM and PM. Selection of FM activates Coupling (21) and Deviation Range (22) Fields.

Soft Function Keys available with this function include:

F1 FM
Selects FM as Demodulation Type.

F2 AM
Selects AM as Demodulation Type.

F3 PM
Selects PM as Demodulation Type.

27. Input

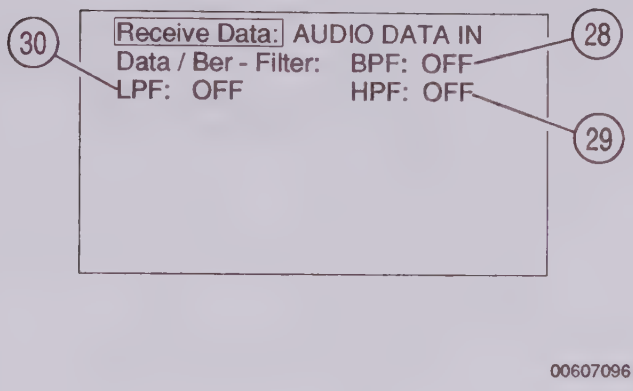
Displays signal Input Connector. Selections include T/R (T/R Connector) and ANT (ANTENNA Connector).

Soft Function Keys available with this function include:

F1 T/R
Selects T/R Connector as Input Connector.

F2 ANT
Selects ANTENNA Connector as Input Connector.

The following items are displayed only when AUDIO DATA IN is selected as Receive Data Input (17):



28. Bandpass Filter

Displays current Bandpass Filter setting for signal passed through AUDIO/DATA IN Connector. Selections include OFF and C-MSG (C-Message Weighted Filter).

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF.

F2 C-MSG
Activates C-Message Weighted Bandpass Filter.

29. High-Pass Filter

Displays current High-Pass Filter setting for signal passed through AUDIO/DATA IN Connector. Selections include OFF, 300 Hz and 4 kHz.

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF.

F2 300 Hz
Activates 300 Hz High-Pass Filter.

F3 4 kHz
Activates 4 kHz High-Pass Filter.

30. Low-Pass Filter

Displays current Low-Pass Filter setting for signal passed through AUDIO/DATA IN Connector. Selections include OFF, 300 Hz, 4 kHz and 20 kHz.

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF.

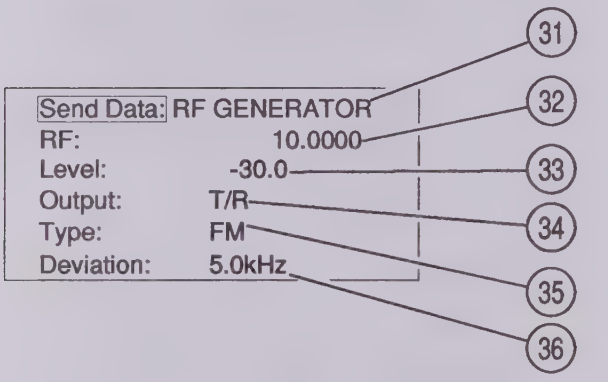
F2 300 Hz
Activates 300 Hz Low-Pass Filter.

F3 4 kHz
Activates 4 kHz Low-Pass Filter.

F4 20 kHz
Activates 20 kHz Low-Pass Filter

D. SEND DATA CONFIGURATION SECTION

This section contains the parameters for setting the Transmitter Portion of the BER Meter. Functions and parameters for the Transmitter portion of the BER Meter are as follows:



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31. Send Data Output

Displays selected Output for BER Meter. Selections include RF GENERATOR and AUD/DATA GEN OUT. Selecting RF GENERATOR means an RF Carrier is modulated with the Data Signal before transmission. Selecting AUD/DATA GEN OUT means Data Signal is transmitted directly through the AUDIO/DATA GEN Connector.

Soft Function Keys available with this function include:

F1 RF GEN
Selects RF Generator as BER Meter source.

F2 DATA GEN
Selects Data Signal output through AUDIO/DATA GEN Connector.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

The following items are displayed only when RF GENERATOR is selected as Send Data Output (31):

32. RF Field

Displays RF Generator Frequency. Selections range from .0000 to 1000 MHz.

33. Level

Displays RF Generator output Level. Selections range from -130 to -30 dBm with T/R Connector selected as Output (34). Selections range from -130 to -13 dBm with AUX RF OUT Connector selected as Output (34).

34. Output

Displays Output Connector. Selections include AUX (AUX RF OUT Connector) and T/R (T/R Connector).

Soft Function Keys available with this function include:

F1 T/R
Selects T/R Connector for Output.

F2 AUX
Selects AUX RF OUT Connector for Output.

35. Modulation Type

Displays Modulation Type. Selections include OFF, AM, FM and PM.

Soft Function Keys available with this function include:

F1 OFF
Set Modulation Source to OFF.

F2 AM
Selects AM for Modulation Type.

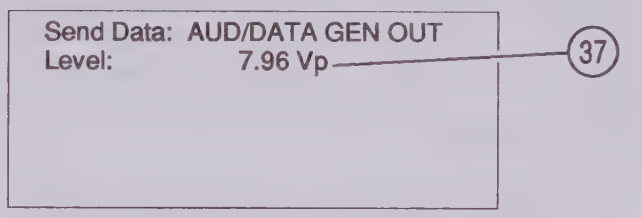
F3 FM
Selects AM for Modulation Type.

F4 PM
Selects AM for Modulation Type.

36. Modulation/Deviation Level

Displays Modulation Level. Selections range from 0.0% to 100% for AM Modulation Type (35), 0.00 to 100 kHz for FM Modulation Type (35) and 0.00 to 10 Rad for PM Modulation Type.

The following items are displayed only when AUD/DATA GEN OUT is selected as Send Data Output (31):



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37. Output Level

Displays Output Level of Data Signal. Selections range from 0.0 to 2.5 Vp in x1 (times 1) Mode or 0 to 25 mVp in /10 (divide by 10) Mode.

F1 x1
Selects x1 Output Mode.

F2 /10
Selects /10 Output Mode.

7-7 SINGLE SIDEBAND RECEIVE FILTER (OPTION 08)

7-7-1 GENERAL

Installation of the Single Sideband Receive IF Filter provides the ability to monitor SSB signals. When Filter is installed, 3 kHz Selection is available for IF Bandwidth Filter. Additionally, a 3 kHz Soft Function Keys is defined.

The Single Sideband and 30 kHz IF Filters are mutually exclusive. Only one additional IF Filter can be installed.

7-7-2 DESCRIPTION OF RECEIVE FUNCTION

RF Receive Operation is changed as follows:

- Analyzer Center Frequency is offset from center graticule ±1800 Hz, depending on whether Upper Sideband (UB) or Lower Sideband (LB) is selected as Demodulation Type.
- No Modulation Meter is provided for Single Sideband. Either Modulation Reading or Modulation Meter, whichever was last selected, is blanked from the screen.
- RF Error Meter is not provided for Single Sideband. RF Error Meter is blanked from the screen.

Additions and Redefinitions of parameters on the RF Receiver Operation Screen are as follows:

1. Demodulation Type

   Includes two additional settings: UB (Upper Sideband) and LB (Lower Sideband).

   Soft Function Keys available with this function include:

   F4 LB
   Selects Lower Sideband Demodulation.

   F5 UB
   Selects Upper Sideband Demodulation.

2. IF Bandwidth

   Includes additional 3 kHz setting.

   Soft Function Keys available with this function include:

   F3 3 kHz
   Selects 3 kHz Optional IF Bandwidth Filter. Renamed depending on Demodulation Type (1).

3. BFO Frequency

   Tone/Data Code Field is renamed when UB or LB is selected as Demodulation Type (1). Displays selected adjustment for BFO Frequency. Adjustment range is ±4.0 kHz. No Soft Function Keys are defined when BFO Frequency is displayed.

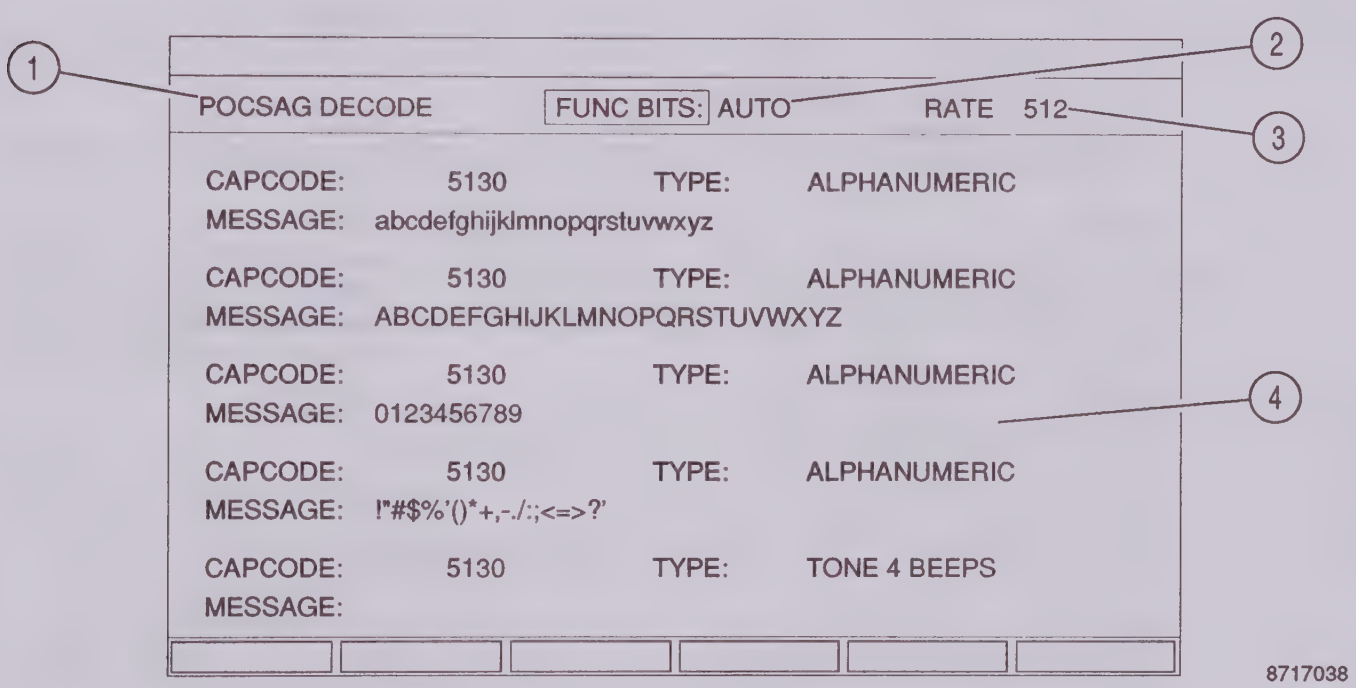
4. AGC Setting

   Displays current AGC Setting, AUTO or MANUAL. AUTO provides automatic gain control while MANUAL sets feedback level for automatic gain control to defined level. Selection of MANUAL accesses Feedback Level Data Field. Range is 0 to 1023.

7-9-3 DECODING DIGITAL SIGNALING FORMATS

With Option 11 installed, the RF Receive Operation Screen and the Duplex Receive Operation Screen can be configured to decode POCSAG and Inverted POCSAG signals. A specific decode screen is provided for each Digital Signaling format type.

Information provided from the Decode Screens is as follows:



1. Decode Screen Label

   Identifies whether Decode Screen format is POCSAG or POCSAG INV (Inverted POCSAG).

2. Function

   Allows user to set Message Type to ALPHANO (ALPHANUMERIC), NUMERIC or AUTO. ALPHANO and NUMERIC settings force Decode Function to decode message as specified type. AUTO setting allows Decode Function to determine Message Type from received data.

   Soft Function Keys available with this field include:

   F1 DECODE
   Activates Decode Function. Field is highlighted when active.

   F2 STOP
   Stops Decode Function.

   F3 MENU
   Accesses menu for selecting format. Soft Function Keys available with this function include:

F1 AUTO
Allows Decode Function to determine Message Type from received data.

F2 NUMERIC
Forces Decode Function to decode message as specified type.

F3 ALPHANO
Forces Decode Function to decode message as specified type.

F5 SCROLL
Toggles Scroll Function On and Off. Decode Screen (4) holds five messages. With Scroll Function active, when sixth message is received, previous five messages are scrolled up (losing one) and sixth message is displayed. Softkey is highlighted when Scroll Function is active.

F6 RETURN
Returns to previous Operation Screen.

3. Data Rate

Displays selected Data Rate for decoding messages. Selections include 512 and 1200 bps.

Soft Function Keys available with this field include:

F1 DECODE
Activates Decode Function. Field is highlighted when active.

F2 STOP
Stops Decode Function.

F3 MENU
Accesses menu for selecting Data Rate. Soft Function Keys available with this function include:

F1 512
Sets Data Rate to 512 bps.

F2 1200
Sets Data Rate to 1200 bps.

F3 2400
Sets Data Rate to 2400 bps.

F4 AUTO
Automatically decodes 1200 or 2400 baud rate incoming POCSAG data. It *does not* handle 512 baud rate.

F5. SCROLL
Toggles Scroll Function On and Off. Decode Screen (4) holds five messages. With Scroll Function active, when sixth message is received, previous five messages are scrolled up (losing one) and sixth message is displayed. Softkey is highlighted when Scroll Function is active.

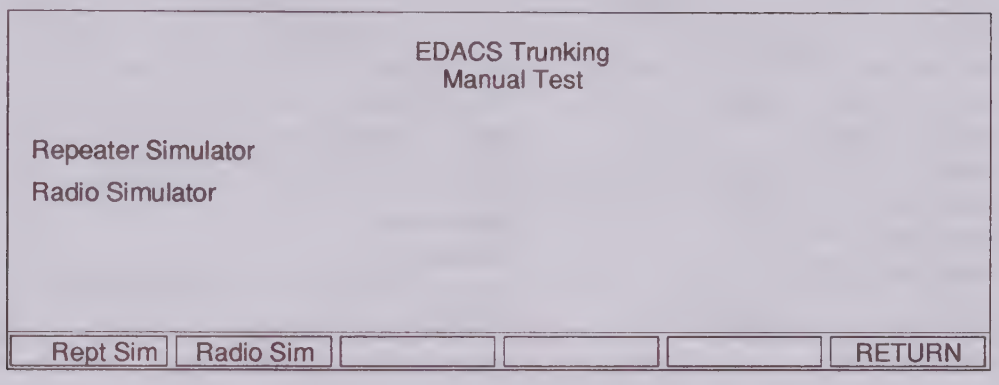
F6 RETURN
Returns to previous Operation Screen.

4. Data Screen

Displays up to five decoded messages. Information displayed includes Capcode, Message Type and Message for each received transmission.

7-14-6 EDACS TRUNKING MANUAL TEST

EDACS Trunking Manual Test Screen:



00616002

The EDACS Trunking Manual Test consists of 2 main parts. A Repeater Simulator for testing EDACS Radios and a Radio Simulator for testing EDACS Repeaters.

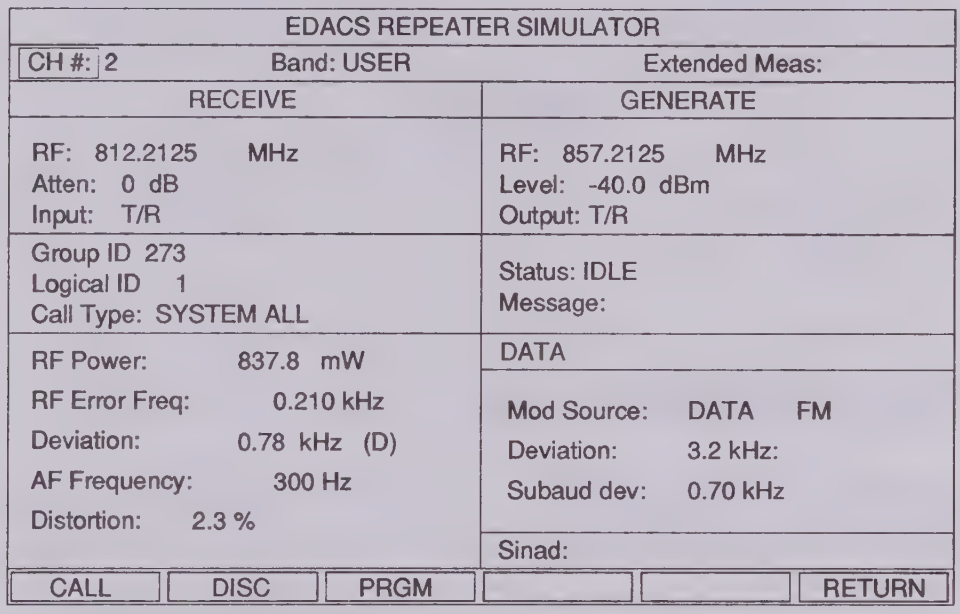
Soft Function Keys available with this function include:

F1 Rept Sim
Accesses the EDACS Repeater Simulator Screen.

F2 Radio Sim
Accesses the EDACS Radio Simulator Screen.

F3 RETURN
Returns to the EDACS Trunking Test screen.

7-14-7 EDACS TRUNKING MANUAL TEST-REPEATER SIMULATOR



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Entering the Repeater Simulator causes the COM-120B to perform an FM-Zero operation to adjust the Receiver's DC offset to zero. The screen displays the message: "Doing FMZ...please wait."

While in the Repeater Simulator and the Radio is not transmitting, or the repeater is not calling the Radio, the Site ID message is continuously transmitting. In this idle mode, the Repeater Simulator is looking for a Call (or Login) request from the Radio. When the request is found, the Repeater Simulator allows the Radio to transmit (until the Radio releases). The Group/Logical ID's are captured (and displayed) when the Group Call is made (and used to call a Radio). A Radio's Login is also decoded by the simulator and the ID's captured. There is also a mode of operation (activated by softkey) where the repeater simulates a Radio calling the Radio Under Test. In this mode, there are softkeys to disconnect and return back to the idle state.

1. CH#:

   This field is used to change the EDACS Repeater Simulator Working Channel, as specified by the Channel Number pre-programmed in the Setup Screen. Value range: 1 to 20. The corresponding RF Frequencies are shown in the RF fields as the CH# field is edited. This only sets the Working Channel. The Control Channel is taken from the Setup Screen and must be changed there if necessary.

   If the Band field is set to 'Manual' there is no channel number to edit. The PRGM Soft Function Key F3 may then be used to return to the channel Band mode.

Soft Function Keys available with this function include:

F1 CALL
Makes a Group Call to the Radio, simulating a call from another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call to the Radio which was made previously using the CALL softkey.

F3 PRGM
Puts the 'Band' mode back to one of the channel modes: 800 MHz, 900 MHz or USER. The logical channels from the Setup Screen are then active. The simulator is taken out of the pre-programmed channel mode when the RF Frequencies are manually edited.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

2. Band:

This field shows the channel format for the Repeater Simulator Working Channel. Valid values are: 800 MHz, 900 MHz, USER or Manual. Display-only field. If 'Manual' is displayed, the RF Frequencies have been set manually in the Repeater Simulator. All other values are taken from the pre-programmed logical channels from the Setup Screen, according to the channel number set in the CH# field.

3. RF: (Receive)

This field shows the current RF Frequency of the EDACS Working Channel for the Receiver side of the Repeater Simulator. This field is editable (which puts the Working Channel in 'Manual' mode). Value range: 0 to 1000.0000 MHz.

Soft Function Keys available with this function include:

F1 CALL
Makes a Group Call to the Radio, simulating a call from another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call to the Radio which was made previously using the CALL softkey.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

4. Atten:

This field is used to set the Receiver Attenuation. Value range: 0 or 30 dB.

F1 30 dB
Sets the Receiver Attenuation to 30 dB.

F2 Sets the Receiver Attenuation to 0 dB.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

5. Input:

This field is used to select the Receiver's RF Input for the Repeater Simulator to the T/R or Antenna connector. Valid values are T/R or ANT.

Soft Function Keys available with this function include:

F1 T/R
Sets the Receiver Input to T/R.

F2 ANT
Sets the Receiver Input to ANT.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

6. Group ID:

This field shows the Radio's Group ID acquired from a Group Call or Login operation (if performed). This field is also used for the Group ID when making a call to the Radio Under Test. This field is editable. Value range: 0 to 2047.

Soft Function Keys available with this function include:

F1 CALL
Makes a Group Call to the Radio, simulating a call from another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call to the Radio which was made previously using the CALL softkey.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

7. Call Type:

This field handles outgoing call processing selections Group, Individual or System-All calls, for Radio and Repeater-initiated calls.

Soft Function Keys available with this function include:

F1 CALL
Makes current selected Call to the Radio, simulating a call from another radio. The ID's used to make the call are taken from the Group/Logical ID fields. For Individual Call, the Caller ID used is one less than the programmed Logical ID.

F2 DISC
Disconnects a call to the Radio which was made previously using the CALL softkey.

F3 GROUP
Group Call is selected and starts when softkey is pressed.

F4 SYS ALL
System-All Call is selected and starts when softkey is presed.

F5 INDV
Individual Call is selected and starts when softkey is pressed.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

8. Logical ID:

This field shows the Radio's Logical ID acquired from a Group Call or Login operation (if performed). This field is also used for the Logical ID when making a call to the Radio Under Test. This field is editable. Value range: 0 to 16383.

Soft Function Keys available with this function include:

F1 CALL
Makes the current selected Call to the Radio, simulating a call

from another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call to the Radio which was made previously using the CALL softkey.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

9. RF Power:

This field shows the Radio's Transmitter RF Power in Watts (or mW). It is a display-only field (meter) with no cursor position. Value range: 0.0 mW to 10.00 W.

10. RF Error Freq:

This field shows the Radio's Transmitter RF Frequency Error in kHz. It is a display-only field (meter) with no cursor position. Value range: ±0.000 to 5.000 kHz.

11. Deviation: (Receive)

This field shows the Radio's Transmit Deviation for Voice or Data in kHz. Voice Deviation is designated with a 'V' symbol, and Data Deviation (low-frequency data) is designated with a 'D' symbol. Value range: 0.00 to 10.00 kHz.

Soft Function Keys available with this function include:

F1 DATA
Shows deviation of low-frequency (data) modulations.

F2 VOICE
Shows voice-range frequency modulations.

F3 FMZ
Used to FM-Zero the Receiver, which adjusts the DC offset to zero. Do this operation if the Radio is having trouble completing a Group Call.

F4 FM CAL
Makes an attempt to move the DC offset to zero in the Receiver. ***Not a recommended operation. The FMZ softkey should be tried first if the Radio does not complete a Group Call. This operation may work on a Radio Under Test that is extremely far off frequency. May require more than one try.***

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

12. AF Frequency:

This field shows the Radio's Transmitter Audio Frequency in Hz. It is a display-only field (meter) with no cursor position. Measuring range: 300 to 4500 Hz.

13. Distortion: (Receive)

This field shows the Radio's Transmitter Distortion in %. Value range: 0.0 to 20.0%. Also used to show decoded DTMF digits by pressing the DTMF softkey.

Soft Function Keys available with this function include:

F1 DIST
Selects Distortion readings (meter).

F2 OFF
Disable Distortion or DTMF readings.

F3 DTMF Selects DTMF decoding.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

14. Extended Meas:

This field allows access to one of three external screens: Scope, Analyzer or Digital Voltmeter (DVM). Radio-initiated Group Calls are still performed while in any of the three screens. If a call was made to the Radio and is still in progress, it is possible to access any of the three screens without interrupting the call. *However, there is no way to call the Radio Under Test or disconnect a made call while in the extended screens. The call must be made before entering an extended screen.* The *only* way to enter the extended screens is to use the softkeys. The 'Return' field in the extended screen allows a return to the Repeater Simulator.

Soft Function Keys available with this function include:

F1 SCOPE
Accesses the Scope Screen.

F2 ANALY
Accesses the Analyzer Screen.

F3 DVM
Accesses the Digital Voltmeter Screen.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

15. RF: (Generate)

This field shows the current RF Frequency of the EDACS Working Channel for the Generator side of the Repeater Simulator. This field is editable (which puts the Working Channel in 'Manual' mode). Value range: 0 to 1000.0000 MHz.

Soft Function Keys available with this function include:

F1 CALL
Makes a Group Call to the Radio, simulating a call from another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call to the Radio which was made previously using the CALL softkey.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

16. Level:

This field is used to set the Generator's RF Output Level in dBm. Value range: -40 to -130.0 dBm (T/R), 13.0 to -130.0 dBm (AUX) with AUX option.

Soft Function Keys available with this function include:

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

17. Output:

This field is used to set the Generator's RF Output source to the T/R port or the Auxiliary (AUX) RF port. Valid values: T/R or AUX.

F1 T/R
Sets the Generator RF Output to the T/R connector.

F2 AUX
Sets the Generator RF Output to the AUX connector.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

18. Status:

This field shows the current status of the Repeater Simulator. It is a display-only field. Valid status values:

IDLE
Repeater is in the idle state, generating overhead (Site ID) messages. In this state, the Radio may initiate a Group Call, do a Login or the simulator may initiate another call to another radio.

RADIO SETUP
Repeater is in the process of processing a Call from the Radio. *This message is usually very brief and may not be noticeable.*

RADIO INIT
Repeater successfully completes a Call from the Radio and call is in progress.

REP INIT
Repeater made a Group Call to the Radio.

19. Message:

Briefly shows the last EDACS message received from the Radio. Display-only field.

GROUP CALL
A Group Call message is received from the Radio

UN-KEYED
An un-keyed message is received from the Radio.

EMER GROUP
An Emergency Group Call message is received from the Radio.

LOGIN
A Login message is received from the Radio.

STATUS
A Status message is received from the Radio.

INDV CALL *(Log ID)*
An Individual Call is received from the radio. The Logical ID of the radio being called is shown in parenthesis.

SYSTEM ALL
A System-All Call is received from the radio.

20. Mod Source:

This field is used to select a Generator source for modulation. GEN1, GEN2 and DTMF are only modulated when a call is made to the Radio. The DATA modulation field is used to modulate the EDACS signaling data. All enabled modulation sources display above the Mod Source field.

Soft Function Keys available with this function include:

F1 GEN1
Selects Function Generator 1 as the modulation source.

F2 GEN2
Selects Function Generator 2 as the modulation source.

F3 DATA
Selects Data Generator as the modulation source.

F4 DTMF
Selects DTMF as the modulation source.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

In the field to the right of Mod Source, select the modulation type for the selected source.

Soft Function Keys available with this function include:

F1 OFF
Turn off the selected Generator source.

F2 AM
Sets the selected Generator source for AM modulation.

F3 FM
Sets the selected Generator source for FM modulation.

F4 PM
Sets the selected Generator source for PM modulation.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

21. Deviation: (Generate)

This field is active when the selected source is FM or PM modulation type. This controls the deviation of the modulated source. Value range: 0.00 to 100.0 kHz for FM and 0.00 to 10.0 Rad for PM. *For deviation of DATA, 3.2 kHz is the recommended default value.*

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

22. Modulation:

This field is active when the selected source is AM modulation type. This controls the modulation of the selected source. Value range: 0.0% to 100.0%.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

23. Frequency:

This field is active when the selected source, GEN1 or GEN2, is modulated. This selects the Audio Frequency of the selected Function Generator source (sine wave). Value range: 0.0 Hz to 20000.0 Hz.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

24. Subaud dev:

This field is active when the selected source, DATA, is modulated. This controls the deviation of the sub-audible data used during established call processing with the EDACS Radio. Value range: 0.00 to 100.0 kHz. *Should be ≤ Deviation (20). The recommended default value is 0.70 kHz.*

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

25. Code:

This field is active when the selected source, DTMF, is modulated. This allows the entry of desired DTMF digits to use for DTMF source generation.

F1 CLEAR
Clears out any DTMF digits previously programmed in.

F2 CONT
Puts the DTMF Generation in the continuous mode.

F3 BURST
Used to one-shot the DTMF Generator source.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

26. Sinad:

This field is used to select a meter to read signals from the Audio/Data/ SINAD input baseband jack. The measurements appear to the right of this field. Valid selections:

Soft Function Keys available with this function include:

F1 DIST
Selects the Distortion meter for baseband measurements.

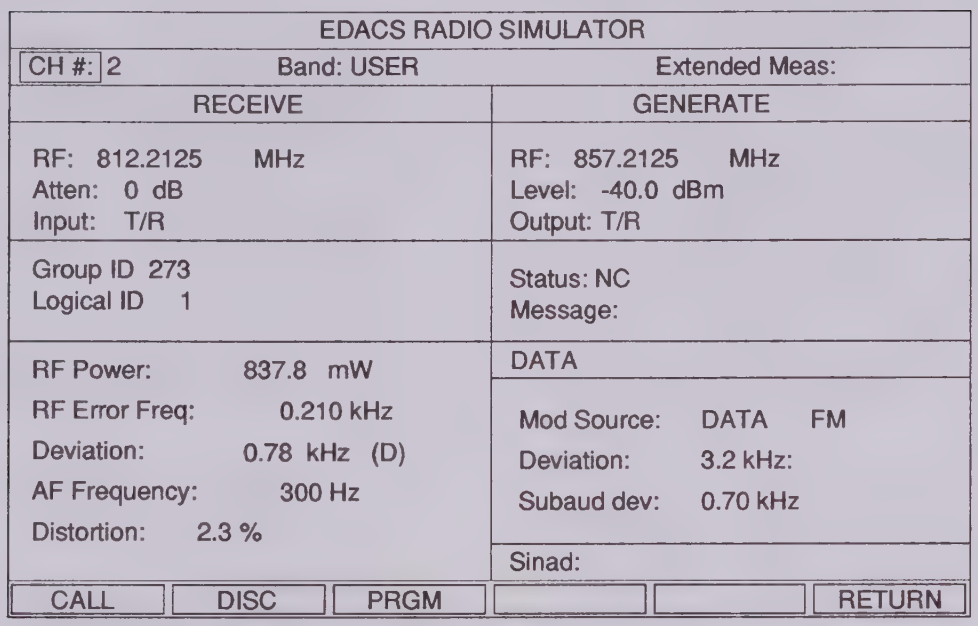
F2 SINAD
Selects the SINAD meter for baseband measurements.

F3 AF LVL
Selects the AF Level meter for baseband measurements.

F4 OFF
Disables baseband measuring.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

When baseband measurements are made, all receiver measurements including the DSP data decoding are disabled due to hardware limitations. Therefore an EDACS Radio-initiated call cannot be made with any baseband measurements enabled. The Radio-initiated call must be made first, then the baseband measurements may be enabled during the call. Calling the Radio may be done at any time.



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Entering the Repeater Simulator causes the COM-120B to perform an FM-Zero operation to adjust the Receiver's DC offset to zero. The screen displays the message: "Doing FMZ...please wait."

While in the Radio Simulator the Control Channel is continually monitored looking for SITE-ID from the controller. If not found, the NC status is shown. When a SITE-ID message is found, the status goes to IDLE. This allows Group Calls to be made (Push-to-Talk) or calls to be made to the COM-120B from another Radio as dictated by the Repeater. There are 3 main call-processing sequences supported in the Radio Simulator. Perform a Group Call, receive a call in response to a Channel Assignment message from a Repeater and receive a call in response to a Channel Update message from a Repeater (if coming on-line during a call).

Several error conditions can occur during the Radio Simulation. Error messages display briefly under these conditions. The error messages:

LOST CHANNEL
: The Radio has lost contact with the Repeater during a Group Call.

CHAN OUT OF RANGE
: A channel assignment from the Repeater was out of pre-programmed Channel range.

INVALID ID
: An ID other than what was set in the Logical/Group ID fields was used to call the Radio Simulator.

NO UN-MUTE FOUND
: The Repeater has transmitted the channel assignment to the Radio Simulator for calling the simulator, but did not send the Un-mute message on the Working Channel.

NO CHAN ASSGN FOUND
: The Channel Assignment message was not received from the Repeater when a Group Call

(PTT) was executed from the Radio Simulator.

1. CH#:

This field is used to change the EDACS Control Channel Number (pre-programmed in the Setup Screen). Value range: 1 to 20. The corresponding RF Frequencies are shown in the RF fields as the CH# field is edited.

If the Band field is set to 'Manual', there is no channel number to edit. The PRGM Soft Function Key F3 may then be used to return to the channel Band mode.

Soft Function Keys available with this function include:

F1 CALL
Simulates a Group Call (PTT) to another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call (release PTT) which was made previously using the CALL softkey.

F3 PRGM
Puts the 'Band' mode back to one of the channel modes: 800 MHz, 900 MHz or USER. The logical channels from the Setup Screen are then active. The simulator is taken out of the channel mode when the RF Frequencies are manually edited.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

2. Band:

This field shows the channel format for the Radio Simulator Control Channel. Valid values are: 800 MHz, 900 MHz, USER or Manual. Display-only field. If 'Manual' is displayed, the RF Frequencies have been set manually in the Radio Simulator. All other values are taken from the pre-programmed logical channels from the Setup Screen, according to the channel number set in the CH# field.

3. RF: (Receive)

This field shows the current RF Frequency of the EDACS Control Channel for the Receiver side of the Radio Simulator. This field is editable (which puts the Control Channel in 'Manual' mode). Value range: 0 to 1000.0000 MHz.

Soft Function Keys available with this function include:

F1 CALL
Simulates a Group Call (PTT) to another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call (release PTT) which was made previously using the CALL softkey.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

4. Atten:

This field is used to set the Receiver Attenuation. Value range: 0 or 30 dB.

F1 30 dB
Sets the Receiver Attenuation to 30 dB.

F2 Sets the Receiver Attenuation to 0 dB.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

5. Input:

This field is used to select the Receiver's RF Input for the Radio Simulator to the T/R or the Antenna port. Valid values are T/R or ANT.

Soft Function Keys available with this function include:

F1 T/R
Sets the Receiver Input to T/R.

F2 ANT
Sets the Receiver Input to ANT.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

6. Group ID:

This field is used to select Radio Simulator's Group ID that is used when simulating a Group Call (PTT) to another Radio. This field is editable. Value range: 0 to 2047.

Soft Function Keys available with this function include:

F1 CALL
Simulates a Group Call (PTT) to another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call (release PTT) which was made previously using the CALL softkey.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

7. Logical ID:

This field is used to select Radio Simulator's Logical ID that is used when simulating a Group Call (PTT) to another Radio. This field is editable. Value range: 0 to 16383.

F1 CALL
Simulates a Group Call (PTT) to another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call (release PTT) made previously using the CALL softkey.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

8. RF Power:

This field shows the Repeater's Transmitter RF Power in Watts (or mW). A display-only field (meter). Value range: 0.0 mW to 10.00 W.

9. RF Error Freq:

This field shows the Repeater's Transmitter RF Frequency Error in kHz. A display-only field (meter). Value range: ±0.000 to 5.000 kHz.

10. Deviation: (Receive)

This field shows the Repeater's Transmit Deviation for Voice or Data in kHz. A 'V' symbol means Voice Deviation. A 'D' symbol means Data Deviation (low-frequency data). Value range: 0.00 to 100.0 kHz.

Soft Function Keys available with this function include:

F1 DATA
Shows deviation of low-frequency (data) modulations.

F2 VOICE
Shows voice-range frequency modulations.

F3 FMZ
Used to FM-Zero the Receiver, which adjusts the DC offset to zero. Do this operation if the Simulator is having trouble completing a Group Call or going to IDLE status.

F4 FM CAL
Makes an attempt to move the DC offset to zero in the Receiver. ***Not a recommended operation. The FMZ softkey should be tried first if the Radio does not complete a Group Call. This operation may work on a Simulator Under Test that is extremely far off frequency. May require more than one try.***

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

11. AF Frequency:

This field shows the Repeater's Transmitter Audio Frequency in Hz. It is a display-only field (meter) with no cursor position. Measuring range: 300 to 4500 Hz.

12. Distortion: (Receive)

This field shows the Repeater's Transmitter Distortion in %. Value range: 0.0 to 20.0%. Also used to show decoded DTMF digits by pressing the DTMF softkey.

Soft Function Keys available with this function include:

F1 DIST
Selects Distortion readings (meter).

F2 OFF
Disable Distortion or DTMF readings.

F3 DTMF Selects DTMF decoding.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

13. Extended Meas:

This field allows access to one of three external screens: Scope, Analyzer or Digital Voltmeter (DVM). If a Group Call (PTT) was made to another Radio and is still in progress, it is possible to access any of the three screens without interrupting the call. The *only* way to enter the extended screens is to use the softkeys. The 'Return' field in the extended screen allows a return to the Repeater Simulator.

Soft Function Keys available with this function include:

F1 SCOPE
Accesses the Scope Screen.

F2 ANALY
Accesses the Analyzer Screen.

F3 DVM
Accesses the Digital Voltmeter Screen.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

14. RF: (Generate)

This field shows the current RF Frequency of the EDACS Control Channel for the Generator side of the Radio Simulator. This field is editable (which puts the Control Channel in 'Manual' mode). Value range: 0 to 1000.0000 MHz.

Soft Function Keys available with this function include:

F1 CALL
Simulates a Group Call (PTT) to another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call (release PTT) which was made previously using the CALL softkey.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

15. Level:

This field is used to set the Generator's RF Output Level in dBm. Value range: -40 to -130.0 dBm (T/R), 13.0 to -130.0 dBm (AUX) with AUX option.

Soft Function Keys available with this function include:

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

16. Output:

This field is used to set the Generator's RF Output source to the T/R port or the Auxiliary (AUX) RF port. Valid values: T/R or AUX.

F1 T/R
Sets the Generator RF Output to the T/R connector.

F2 AUX
Sets the Generator RF Output to the AUX connector.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

17. Status

This field shows the current status of the Radio Simulator. Display-only field. Valid status values:

NC
No Control Channel overhead found from the Repeater. No calls accepted in this state.

IDLE
Radio is locked into a Repeater Site and is waiting to make a Group Call or accept a Group Call.

BEGIN CALL
A Group Call is initiated and call processing with the Repeater is in progress. This message is usually brief.

GROUP CALL
Radio Simulator successfully executed a Group Call and is transmitting/receiving on the Working Channel assigned by the Repeater Under Test. The Working Channel is displayed in parenthesis.

CALLED
A call is made to the Radio Simulator and is transmitting/receiving on the Working Channel assigned by the Repeater Under Test. The words "EMG" is displayed if an Emergency Group Call was made.

18. Message:

Briefly shows the last EDACS message received from the Repeater. Display-only field.

GRP CHAN ASSGN
A Group Call Channel Assignment message is received from the Repeater.

CH UPDATE
A Channel Update message is received from the Repeater.

CALL DROP
A Call Drop message is received from the Repeater.

19. Mod Source:

This field is used to select a Generator source for modulation. Sources are only modulated when a call (PTT) is initiated from the Radio Simulator. The DATA modulation field is to modulate the EDACS signaling data. All enabled modulation sources display above the Mod Source field.

Soft Function Keys available with this function include:

F1 GEN1
Selects Function Generator 1 as the modulation source.

F2 GEN2
Selects Function Generator 2 as the modulation source.

F3 DATA
Selects Data Generator as the modulation source.

F4 DTMF
Selects DTMF as the modulation source.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

To the right of Mod Source, select the modulation type for the selected source.

Soft Function Keys available with this function include:

F1 OFF
Turn off the selected Generator source.

F2 AM
Sets the selected Generator source for AM modulation.

F3 FM
Sets the selected Generator source for FM modulation.

F4 PM
Sets the selected Generator source for PM modulation.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

20. Deviation: (Generate)

This field is active when the selected source is FM or PM modulation type. This controls the deviation of the modulated source. Value range: 0.00 to 100.0 kHz for FM and 0.00 to

10.0 Rad for PM. *For deviation of DATA, 3.2 kHz is the recommended default value.*

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

21. Modulation:

This field is active when the selected source is AM modulation type. This controls the modulation of the selected source. Value range: 0.0% to 100.0%.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

22. Frequency:

This field is active when the selected source, GEN1 or GEN2, is modulated. This selects the Audio Frequency of the selected Function Generator source (sine wave). Value range: 0.0 Hz to 20000.0 Hz.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

23. Subaud dev:

This field is active when the selected source, DATA, is modulated. This controls the deviation of the sub-audible data used during an established call initiated from the Radio Simulator. Value range: 0.00 to 100.0 kHz. *Should be ≤ Deviation (20). The recommended default value is 0.70 kHz.*

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

24. Code:

This field is active when the selected source, DTMF, is modulated. This allows the entry of desired DTMF digits to use for DTMF source generation.

F1 CLEAR
Clears out any DTMF digits previously programmed in.

F2 CONT
Puts the DTMF Generation in the continuous mode.

F3 BURST
Used to one-shot the DTMF Generator source.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

25. Sinad:

This field is used to select a meter to read signals from the Audio/Data/ SINAD input baseband jack. The measurements appear to the right of this field. Valid selections:

Soft Function Keys available with this function include:

F1 DIST
Selects the Distortion meter for baseband measurements.

F2 SINAD
Selects the SINAD meter for baseband measurements.

F3 AF LVL
Selects the AF Level meter for baseband measurements.

F4 OFF
Disables baseband measuring.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

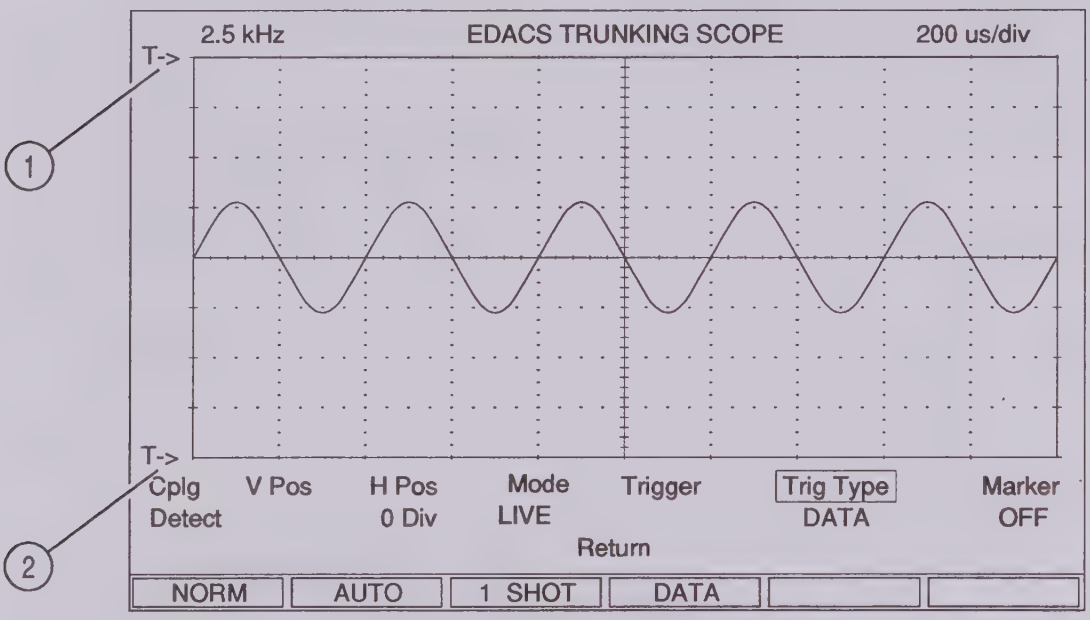
When baseband measurements are made, all receiver measurements including the DSP data decoding are disabled due to hardware limitations.

Therefore an EDACS Call Processing cannot be made with any baseband measurements enabled. The Call Processing must be made first, then the baseband measurements may be enabled during the call.

7-14-9 EDACS HIGH-SPEED DATA CAPTURE (SCOPE)

The COM-120B provides a reliable capture of the data burst.

Access the EDACS Repeater or Radio Simulator Extended Meas Scope.



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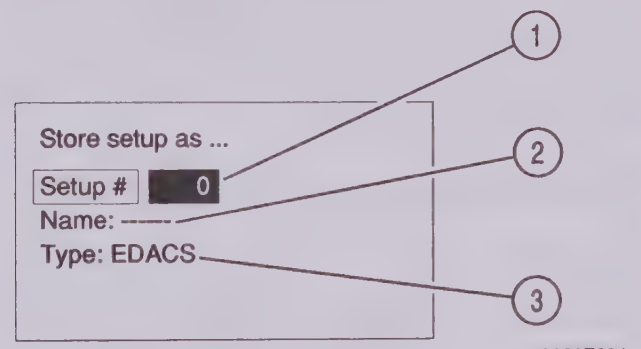
To view the dotting or barker code before the data, set the horizontal position selection negative. Cursor to the *Trig Type* field. The "DATA" type acts like the 1-SHOT mode, triggering when the High-Speed EDACS data is decoded. Use the START/STOP Hard Key or press the DATA Soft Function Key F4 to re-arm the trigger.

It is very important to set the EDACS Trunking Scope trigger level high (top of screen) or low (bottom of screen) enough to avoid causing a trigger before the EDACS Data Burst occurs. Set the scope trigger level to its maximum (1). If the EDACS Data Burst is not visible, set the trigger level to its minimum (2).

7-14-10 EDACS STORE AND RECALL

The COM-120B provides the ability to store and recall EDACS system configurations. Data is stored to one of 50 standard stored test setups under the *Type* EDACS. Press the STORE Hard Key in any EDACS option screen for this menu window:



1. Setup #

   Displays selected Memory Location for storage of current configuration.

2. Name

   Displays optional alphanumeric label for selected Memory Location.

3. Type

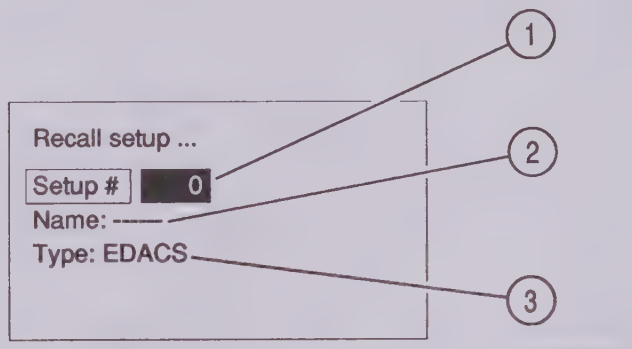
   Displays the type of data currently saved in the specified setup number. Available types to save and recall are: DUPLEX, GENERATOR, RECEIVER, GENERATOR & RECEIVER and EDACS.

   Soft Function Keys available with this function include:

   F1 SAVE
   Finalizes Storage Operation.

   F6 ABORT
   Escapes Storage Operation without editing.

Press the RECALL Hard Key in any EDACS option screen for this menu window:



1. Setup #

   Displays selected Memory Location for storage of current configuration.

2. Name

   Displays optional alphanumeric label for selected Memory Location.

3. Type

   Displays the type of data currently saved in the specified setup number. Available types to save and recall are: DUPLEX, GENERATOR, RECEIVER, GENERATOR & RECEIVER and EDACS.

   Soft Function Keys available with this function include:

   F1 RESTORE
   Finalizes Recall Operation.

   F6 ABORT
   Escapes Storage Operation without editing.

7-14-11 EDACS TRUNKING OPERATIONAL NOTES

This section provides some notes and hints on operating the EDACS Trunking Option of the COM-120B unit.

Squelch Setting

The squelch knob setting on the COM-120B unit is very important for all testing.

While in the EDACS Trunking Main Screen with no RF being transmitted into the COM-120B unit, turn the squelch knob full counter-clockwise. The green squelch light is ON. Slowly turn the knob clockwise until the green light just goes off (make sure there is no flickering). This setting is valid for all EDACS testing.

Control/Working Channels

If a radio is having trouble locking onto the Repeater Simulator, completing calls or the Radio Simulator is showing NC, check the programming of the Control and/or Working Channels in the Setup menu. These channels must be valid for the particular system under test.

Data Generation

If the radio won't lock onto the Repeater Simulator, won't stay up when being called or the Radio Simulator is having trouble completing calls, check the DATA Mod Source. The DATA Mod Source must be set for FM Modulation. The recommended deviation is 3.2 kHz with a sub-audible deviation of 0.70 kHz.

Logical/Group ID

If a radio can not be called in the Repeater Simulator or can not make a call in the Radio Simulator, check the Group/Logical ID. The Group ID must valid for the system under test.

FM-Zero

If a radio is having trouble completing a Group Call (maybe works 50% of the time), an FM-Zero (FMZ) operation may be necessary. Do this in the Automatic Test using FMZ Soft Function Key F4 while in the idle state, or do it in any manual mode simulator by cursoring to the Deviation field in the left column and pressing FMZ Soft Function Key F3.

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SAFETY FIRST:
TO ALL OPERATIONS & SERVICE PERSONNEL

READ AND LEARN THESE PAGES IN THEIR ENTIRETY. THE EXPLANATIONS GIVEN APPLY TO BOTH OPERATORS AND SERVICE PERSONNEL AS A MATTER OF SAFETY WHEN USING THIS PRODUCT AND WHEN REFERENCING THIS MANUAL.

REFER ALL SERVICING OF UNIT TO QUALIFIED TECHNICAL PERSONNEL.

SAFETY IDENTIFICATION IN TECHNICAL MANUAL

The following terms are used throughout this manual to draw attention to possible safety hazards, which may exist when operating or servicing this equipment.

CAUTION: THIS TERM IDENTIFIES CONDITIONS OR ACTIVITIES WHICH, IF IGNORED, CAN RESULT IN EQUIPMENT OR PROPERTY DAMAGE (E.G., FIRE).

WARNING: THIS TERM IDENTIFIES CONDITIONS OR ACTIVITIES WHICH, IF IGNORED, CAN RESULT IN PERSONAL INJURY OR DEATH.

SAFETY IDENTIFICATION USED IN EQUIPMENT

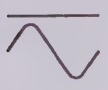
Markings identified with the terms CAUTION and DANGER are to be addressed before accessing that part of the device.

CAUTION: A HAZARD EXISTS WHICH, IF IGNORED, COULD RESULT IN DAMAGE TO THE DEVICE OR PROPERTY. SUCH A MARKING IS NOT LIKELY TO CAUSE PERSONAL INJURY IN THE VICINITY OF THE MARKING.

DANGER: A PERSONAL INJURY HAZARD EXISTS AT THE IMMEDIATE PLACEMENT OF THE MARKING ON THE DEVICE. SPECIAL PRECAUTIONS MUST BE OBSERVED WHEN REQUIRED TO PERFORM ANY TASK IN THE VICINITY OF THESE MARKINGS.

SAFETY SYMBOLS IN MANUALS & ON UNITS

INFORMATION PRECAUTION: Corresponds with an applicable item on the device and in the manual. This symbol defines specific voltage, current and power requirements or other related information for safe operation or service of equipment.



AC OR DC TERMINAL: Terminal which may supply or be supplied with ac or dc.

DC TERMINAL: Terminal which may supply or be supplied with dc or direct voltage.

AC TERMINAL: Terminal which may supply or be supplied with ac or alternating voltage.

SWITCH OFF: Ac line power to the device is OFF.

SWITCH ON: Ac line power to the device is ON.

POWER SUPPLY

This device is intended for operation from a power source no more than 120 VAC (North American)/240 VAC (European) at a frequency of 50 to 400 Hz. Power supply specifications are provided within the manual.

EQUIPMENT GROUNDING PRECAUTION

When equipment is connected to ac power, it must be connected to LOAD, NEUTRAL and GROUND inputs at their respective points of contact. Improper grounding of equipment can result in electrical shock anywhere on the device, even if it appears to be insulated.

USE OF PROBES

Check the maximum voltage, current and power ratings of any connector on the equipment in the product specifications prior to connecting it with a probe from a terminal device. Be sure the terminal device performs within these specifications prior to using it for measurement, to prevent electrical shock or damage to the equipment.

POWER CORDS

Power cords are supplied specifically for use with this product for 12 Vdc and 120 VAC operation (U.S.). The power cord must not be frayed, broken nor expose bare wiring when operating this equipment, to prevent electrical shock, fires and to protect your equipment.

USE RECOMMENDED FUSES ONLY

Fuses are provided to prevent electrical fire and for protection of equipment. Use only fuses specifically recommended for the equipment at the specified current and voltage ratings.

OPERATION OF EQUIPMENT IN HAZARDOUS ENVIRONMENT

Do not operate equipment in an explosive environment, out of doors in an electrical storm nor under any other such dangerous circumstances, unless the equipment has been specifically designated for use in such an adverse environment. Environmental requirements are listed with the specifications of this product.

CASE, COVER OR PANEL REMOVAL

Removing protective covers, casings or panels from this product exposes the operator to electrical hazards which can result in electrical shock or equipment damage. Do not operate this equipment with the case, cover or panels removed.

WARNING

HIGH VOLTAGE EQUIPMENT

THIS EQUIPMENT CONTAINS CERTAIN CIRCUITS AND/OR COMPONENTS OF EXTREMELY HIGH VOLTAGE POTENTIALS, CAPABLE OF CAUSING SERIOUS BODILY INJURY OR DEATH. WHEN PERFORMING ANY OF THE PROCEDURES CONTAINED IN THIS MANUAL, HEED ALL APPLICABLE SAFETY PRECAUTIONS.

RESCUE OF SHOCK VICTIMS

1. DO NOT ATTEMPT TO PULL OR GRAB THE VICTIM.
2. IF POSSIBLE, TURN OFF THE ELECTRICAL POWER.
3. IF YOU CANNOT TURN OFF ELECTRICAL POWER, PUSH, PULL OR LIFT THE VICTIM TO SAFETY USING A WOODEN POLE, ROPE OR SOME OTHER DRY INSULATING MATERIAL.

FIRST AID

1. AS SOON AS VICTIM IS FREE OF CONTACT WITH SOURCE OF ELECTRICAL SHOCK, MOVE VICTIM A SHORT DISTANCE AWAY FROM SHOCK HAZARD.
2. CALL FOR DOCTOR AND/OR AMBULANCE, IMMEDIATELY.
3. IF BREATHING HAS STOPPED; ADMINISTER CARDIO-PULMONARY RESUSCITATION (CPR), AS NEEDED.
4. IF VICTIM IS BREATHING, ATTEMPT TO CONTROL ALL SERIOUS BLEEDING.
5. KEEP VICTIM WARM, QUIET AND FLAT ON HIS/HER BACK.

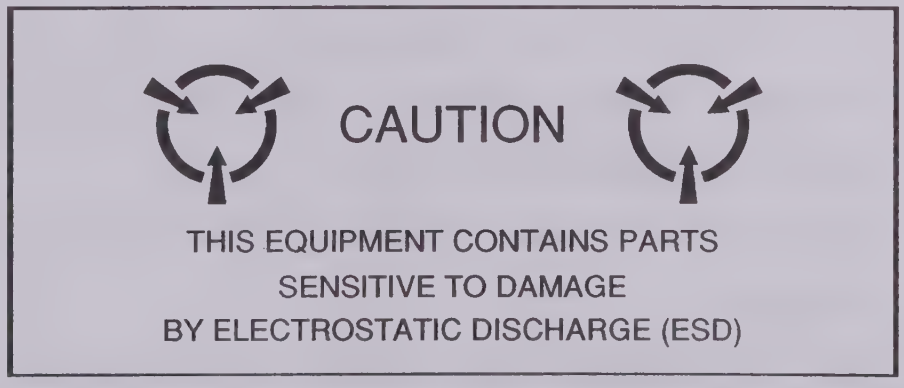
WARNING: **DEVICES MUST NOT BE INSERTED NOR REMOVED FROM CIRCUITS WITH POWER ON.**

CAUTION: INTEGRATED CIRCUITS AND SOLID STATE DEVICES SUCH AS MOS FETS, ESPECIALLY CMOS TYPES, ARE SUSCEPTIBLE TO DAMAGE BY ELECTROSTATIC DISCHARGES RECEIVED FROM IMPROPER HANDLING, THE USE OF UNGROUNDED TOOLS, AND IMPROPER STORAGE AND PACKAGING. ANY MAINTENANCE TO THIS UNIT MUST BE PERFORMED WITH THE FOLLOWING PRECAUTIONS:

- BEFORE USING A CIRCUIT, KEEP ALL LEADS SHORTED TOGETHER WITH VENDOR-SUPPLIED SHORTING SPRINGS OR BY INSERTING LEADS INTO A CONDUCTIVE MATERIAL.
- GROUND THE HAND BEING USED TO REMOVE DEVICES FROM THEIR CONTAINERS WITH A CONDUCTIVE WRISTBAND. REMOVE ALL METAL JEWELRY BEFORE WORKING WITH DEVICES.
- TIPS OF SOLDERING IRONS, AND ALL OTHER TOOLS, MUST BE GROUNDED WHEN USED.
- PC BOARDS, WHEN REMOVED FROM EQUIPMENT, MUST BE SET ON A GROUNDED CONDUCTIVE MAT OR STORED IN A CONDUCTIVE STORAGE BAG. REMOVE ANY BUILT-IN POWER SOURCE, SUCH AS A BATTERY, BEFORE LAYING PC BOARDS ON A CONDUCTIVE MAT OR STORING IN A CONDUCTIVE BAG.
- PC BOARDS, IF BEING SHIPPED TO THE FACTORY FOR REPAIR, MUST BE PACKAGED IN A CONDUCTIVE BAG AND PLACED IN A WELL-CUSHIONED SHIPPING CONTAINER.

THE USE OF SIGNAL GENERATORS FOR MAINTENANCE AND OTHER ACTIVITIES CAN BE A SOURCE OF ELECTRO-MAGNETIC INTERFERENCE (EMI) TO COMMUNICATION RECEIVERS, WHICH CAN CAUSE DISRUPTION AND INTERFERENCE TO COMMUNICATION SERVICE OUT TO A DISTANCE OF SEVERAL MILES.

USERS OF THIS EQUIPMENT SHOULD SCRUTINIZE ANY OPERATION WHICH RESULTS IN RADIATION OF A SIGNAL (DIRECTLY OR INDIRECTLY) AND SHOULD TAKE NECESSARY PRECAUTIONS TO AVOID POTENTIAL COMMUNICATION INTERFERENCE PROBLEMS.



PREFACE

SCOPE

This manual contains instructions for operating the COM-120B Communications Service Monitor. The instruction level is relatively basic and presupposes no previous experience on the part of the operator with a communication service monitor of this type. A basic understanding of communication electronics and practical troubleshooting methods is helpful. It is strongly recommended that the operator be thoroughly familiar with this manual before attempting to operate the unit.

ORGANIZATION

The COM-120B Operation Manual is composed of the following sections:

SECTION 1 - INTRODUCTION

Provides an introduction to the unit and a brief overview of unit functions. Specifications are also included in this section.

SECTION 2 - INSTALLATION

Provides a step-by-step procedure for placing the COM-120B into operation.

SECTION 3 - DESCRIPTION OF CONTROLS, CONNECTORS AND INDICATORS

Identifies and functionally describes all COM-120B controls, connectors and indicators. All Operation Screens and Menus are identified and available parameters listed and explained.

SECTION 4 - OPERATION

Provides instructions for operating the COM-120B Mode Operating Screens and Menus. In addition, this section contains a selection of basic operating procedures pertaining to all major functions of the Test Set.

SECTION 5 - REMOTE OPERATION

Provides procedures for configuring and operating the COM-120B remotely. Lists unit specific commands for remote operations as well as commands mandated by IEEE 488.2 1987.

SECTION 6 - GENERAL TMAC (Test Macro Language)

Identifies and explains construction and use of COM-120B Test Macro Language.

SECTION 7 - OPTIONS

Identifies and provides instructions for operating options available with the COM-120B.

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SECTION 1 - INTRODUCTION

1-1 GENERAL

The COM-120B is a microprocessor controlled, digitally synthesized communication service monitor which combines the operations of many different test instruments into a single, compact unit. The COM-120B is capable of performing these functions:

- RF Generator
- RF Receiver
- Full Duplex Operation
- Spectrum Analyzer
- Audio/Data/Signaling Generators
- Oscilloscope
- DVM
- Deviation Meter
- Distortion Meter
- SINAD Meter
- Audio Frequency Meter
- Frequency Error Meter
- RF Power Meter
- Modulation Meter
- Received Level Meter

The COM-120B utilizes an alphanumeric keypad, dedicated function keys, multitask "Soft" Function Keys and a high-resolution, monochrome flat panel display. This instrument performs tests remotely or manually. Microprocessor controlled memory allows parameter storage and recall.

The COM-120B is capable of storage and recall of Oscilloscope and Spectrum Analyzer traces for signal comparison. The most importAntenna aspect of this instrument is the ability to simultaneously perform many of the functions. The three basic modes of operation in the COM-120B are: RF Generate Operation, RF Receive Operation and Duplex Operation. These modes allow the performance of generate and receive in duplex and simplex mode, while testing other aspects of the Unit Under Test such as Modulation Level, Power, Sensitivity and Frequency Error.

Additionally, the COM-120B provides several independent test instruments operable while not in the three main Operation Modes. These test instruments include:

- Audio/Data/Signaling Generators
- Oscilloscope
- Spectrum Analyzer
- Meters

1-2 RF GENERATE OPERATION

Generating

The COM-120B is capable of generating modulated or unmodulated carrier signals from 250 kHz to 1000 MHz. The output level is variable from -130 to -13 dBm. Modulation types include AM, FM and PM (Phase Modulation) or modulation can be applied from an external source. The COM-120B is capable of generating DTMF, User Defined Tone Codes and Digital Codes.

Meters

Metering functions available for this operation mode include SINAD, Distortion, and Audio Frequency Level. The Oscilloscope and Spectrum Analyzer are also available.

Testing

Tests in RF Generate Operation include Receiver Sensitivity, Selectivity, and Audio Frequency Level Measurements. Test decode capability for defined and DCS protocols using the Tone and Digital Coding functions.

1-3 RF RECEIVE OPERATION

Receiving

The COM-120B is capable of receiving modulated and unmodulated signals ranging from 250 kHz to 1000 MHz. The COM-120B also demodulates and detects AM, FM and PM modulated signals and is capable of executing defined frequency sweep operation and scanning a range of Frequency List settings at predetermined frequencies in addition to single frequency operation. The Receiver accesses "off-the-air" signals through the AntennaENNA Connector or connects directly to the Unit Under Test through the T/R Connector.

Meters

Metering functions in the COM-120B, available with the Receiver, include RF Power, AM Modulation, FM Deviation, Phase Modulation, Distortion, Frequency Error, AF Frequency, Received Level and SINAD. The Oscilloscope and Spectrum Analyzer are also available.

Testing

Other tests in RF Receive Operation include measuring Carrier Power, measuring Modulation, Distortion and SINAD measurement and Frequency/Frequency Error measurement. Use the independent Audio/Data/Signaling Generators to modulate the Unit Under Test while performing RF Receive Operation.

1-4 DUPLEX OPERATION

The COM-120B features Duplex Operation ranging from 250 kHz to 1000 MHz. All features available with the RF Generator and Receiver are also available in Duplex with the added capacity of using offset frequencies up to ±999.7500 MHz. Testing capabilities mirror those found in RF Generate and RF Receive Operations. Duplex Operation is composed of three Operation Screens. The main screen is a Duplex Operation Screen which contains both Receive and Generate information. A Duplex Receive Operation Screen is provided to test the Transmit section of the Unit Under Test and a Duplex Generate Operation Screen is provided to test the Receive section of the Unit Under Test.

1-5 AUDIO FUNCTION GENERATORS

Audio/Tone Coding

The COM-120B has two Audio Generators. One has a range of 10 Hz through 20 kHz and the second has a fixed 1 kHz tone. Sine, square, triangle and ramp are the available waveforms.

DATA

The DATA Generator generates in DCS and DCS Inverted formats.

DTMF

The DTMF Generator generates DTMF coding, up to 16 characters long, in burst or continuous mode or configures the DATA ENTRY Keypad as a DTMF Keypad. The DTMF Mark and Space timing and the time between string transmissions are programmable.

1-6 OSCILLOSCOPE

The COM-120B has a 1 MHz single trace Oscilloscope. The Oscilloscope can operate as a dependent or independent function in each of the Operation Modes. Both functions give the choice of operation modes, live, store, recall, compare and average. The Trigger type choices are Normalized, Auto and One Shot.

Dependent

The dependent Oscilloscope is available with meters and shares space in all Operation Modes with the dependent Spectrum Analyzer. In Generate Operation, sources available for the Oscilloscope are through front panel input connectors, Notch Filter Residual and internal modulation sources. In Receive Operation, sources available for the Oscilloscope are through the front panel input connectors, Audio/Data/Signaling Generators, decode lines, meter lines and the demodulated signal, both filtered and unfiltered. Sweep and scale values differ with each input type.

Independent

The independent Oscilloscope only accepts signals from the SCOPE/DVM Connector. AC, DC and Ground are the available coupling choices.

1-7 SPECTRUM ANALYZER

The Spectrum Analyzer monitors internal and external signals ranging from 250 kHz to 1000 MHz. The Scan width range is editable from 1 kHz to 100 MHz. The Sweep rate and Resolution Band Width (RBW) are editable with a menu or manual edit. An UNCAL indication appears on the screen when settings cause an analyzer uncal situation. The log scales are 2 and 10 dB per division. Amplitude scale units of dBm, dBµV, dBmV, dBV, dBµW and dBW are available in the Independent Spectrum Analyzer and with the Receive Operation. The Generate Spectrum Analyzer is a relative measuring device only and available units are limited to dB. Memory functions for the Spectrum Analyzer include store and recall of a trace, compare a stored trace to a live trace and peak hold. The Slot number is editable. External signals can be "off the air" through the AntennaENNA Connector or connected directly to the T/R Connector. The Independent and Receive Function Spectrum Analyzer have attenuation of 0 and 30 dB through both connectors. The Spectrum Analyzer is available for display alone or with all RF Generate and Receive functions except where the Duplex Transmit and Receive functions are shown simultaneously.

Generate Operation

The Generate Operation Spectrum Analyzer is a relative measuring device only and available units are limited to dB. Scan widths range from 1 kHz to 100 MHz and zero scan. Available log scales are 2 and 10 dB per division. Memory functions for the Spectrum Analyzer include store and recall of a trace, compare a stored trace to a live trace and peak hold.

Receive Operation

The Receive Operation Spectrum Analyzer receives signals ranging from 250 kHz to 1000 MHz. Scan widths range from 1 kHz to 100 MHz and zero scan. Available log scales are 2 and 10 dB per division. Amplitude scale units are dBm, dBµV, dBmV, dBV, dBµW and dBW. Memory functions for the Spectrum Analyzer include store and recall of a trace, compare a stored trace to a live trace and peak hold. Input signals can be "off the air" through the AntennaENNA Connector or connected directly to the T/R Connector. The Spectrum Analyzer has 0 and 30 dB attenuation available through both connectors.

Independent

The Independent Spectrum Analyzer receives signals ranging from 250 kHz to 1000 MHz. Scan widths range from 1 kHz to 100 MHz and zero scan. The log scales are 2 and 10 dB per division. Amplitude scale units are dBm, dBµV, dBmV, dBV, dBµW and dBW are available. Memory functions for the Spectrum Analyzer include store and recall of a trace, compare a stored trace to a live trace and peak hold. Input signals can be "off the air" through the AntennaENNA Connector or connected directly to the T/R Connector. The Spectrum Analyzer has 0 and 30 dB attenuation available through both connectors. Additional Functions available with the Independent Spectrum Analyzer include a Find function for finding signals above a certain level and split screen displaying two Spectrum Analyzer screens.

1-8 METERS

Dependent

The COM-120B provides metering capability in all three Operation Modes. The meters are in Receive Operation, Generate Operation or both. The meters are available for Simplex and Duplex Operation. The meters are represented directly on the Mode Operation Screen as numeric readout or as a bar meter and numeric readout. Although a meter is available in both Receive and Generate Operation, available inputs may differ. Dependent Meters for each Operation Mode are identified below:

Receive Operation	Generate Operation
SINAD	SINAD
Distortion	Distortion
FM Deviation	Audio Level
AM Modulation	
Phase Modulation	
RF Power	
Received Level	
RF Frequency Error	
Audio Counter	

Independent

The COM-120B provides metering capability independent of the Operation Modes. These meters include:

SINAD	Distortion
Audio Counter	Digital Voltmeter

1-9 OPTIONS

Option 01 - Internal Battery

Provides self-contained dc power when external ac or dc power is unavailable.

Option 02 - 0.01 OCXO

Replaces the standard TCXO as system time base. Provides 0.01 x 10^6 accuracy.

Option 03 - 30 kHz IF Filter

This option provides additional band limiting between 15 kHz and 300 kHz offered in a standard set. Required for AMPS Mobile Station Test (Option 15).

Option 04 - Variable Audio Generator 2

Replaces standard fixed 1 kHz Audio Generator with variable frequency Audio Generator.

Option 05 - Generate Amplifier

Internal RF Amplifier providing 26 dB gain for additional RF output.

Option 07 - Data Generator/Bit Error Rate (BER) Meter

This option provides testing for digital characteristics of transceivers.

Option 08 - SSB Receive Filter

This option provides ability to monitor SSB signals.

Option 09 - RCC Signaling

This option provides 10 PS, 20 PS, MTS, IMTS and Tone Remote Control signaling.

Option 11 - Audio/Digital Signaling

This option provides encode/decode capabilities for the following formats:

CCIR	CCIRH	CCIRH4
EEA	EIA	NATEL
ZVEI	DZVEI	DDZVEI
EURO	5/6 Tone	POCSAG

Option 12 - Tracking Generator

This option provides internal Tracking Generator for use with Spectrum Analyzer.

Option 13 - IEEE 488 (GPIB) Interface

This option provides parallel GPIB interface for remote operation.

Option 14 - CLEARCHANNEL LTR®

Simulates the CLEARCHANNEL LTR® repeater system. CLEARCHANNEL LTR® is a registered trademark of E. F. Johnson.

Option 15 - AMPS Mobile Station Test

Auto and manual test to verify operation of AMPS mobiles, transportables and portables.

Option 16 - EDACS

Provides test capability for EDACS repeaters and mobiles.

1-10 COM-120B PRODUCT SPECIFICATIONS

A warm-up time of 5 minutes is required for the following performance requirements.

RF measurements are referenced to 50 Ω.

Accuracy and Resolution stated in percent are referenced to measured or selected value unless otherwise stated.

Where resolution exceeds accuracy, resolution take precedence.

Specifications and features are subject to change without notice.

RF SIGNAL GENERATOR

Frequency

Range:	250 kHz to 999.9999 MHz
Resolution:	100 Hz
Accuracy:	*Same as Master Oscillator.*

Supplemental Characteristic

Tunable Range:	Tunable from 100 Hz to 999.9999 MHz (characteristics below 250 kHz are not specified)

Output (T/R and AUX RF Connectors)

Range (T/R):	-130 to -20 dBm (Simplex Mode) -130 to -40 dBm (Duplex Mode)
Range (AUX):	-130 to -13 dBm
Resolution:	0.1 dB
Accuracy:	±2 dB (>-90.0 dBm, <400 MHz) ±2.5 dB otherwise
VSWR:	<1.15:1 (0.25 to ≤100 MHz) <1.23:1 (>100 to ≤400 MHz) <1.38:1 (>400 MHz)

Spectral Purity

Residual FM:	<20 Hz (rms, 0.3 to 3 kHz BW)
Residual AM:	<0.5% (rms, 0.3 to 3 kHz BW)

Harmonics:	<-26 dBc
Non Harmonics:	<-50 dBc (≤1000 MHz) <-40 dBc (>1000 MHz)
Input Protection (T/R):	50 W CW continuous 100 W CW (90 sec/3 min) 150 W CW (30 sec/3 min) 200 W CW (15 sec/3 min)
(AUX):	Up to 0.25 W

MODULATION

Frequency Modulation

Range:	100 Hz to 100 kHz
Resolution:	10 Hz (0.01 to 2.55 kHz) 50 Hz (2.60 to 12.75 kHz) 100 Hz (12.8 to 25.5 kHz) 500 Hz (26 to 100 kHz)
Accuracy:	±5% + residual FM, (1 kHz rate, GEN1, GEN 2, EXT MOD) ±10% + residual FM (DATA GEN) ±15% + residual (DTMF GEN)
Distortion:	<2% (1 kHz sine wave, 10 kHz deviation, 0.3 to 3 kHz BW)

Supplemental Characteristic

Rate:	10 Hz to 20 kHz-FSK rates up to 40 kbps
EXT MOD Sensitivity:	2 kHz/V_{pk} ±10% (FM Narrow) 10 kHz/V_{pk} ±10% (FM Wide)

Amplitude Modulation

Range:	30% to 90%
Resolution:	1%
Accuracy:	±5% + residual AM (1 kHz rate, GEN1, GEN2, EXT MOD, ≤400 MHz and <+7 dBm or >400 MHz and <0 dBm) ±15% + residual AM (DTMF GEN, ≤400 MHz and <+7 dBm or >400 MHz, <0 dBm)
Distortion:	<2% (30% to 90% modulation, 1 kHz rate, 0.3 to 3 kHz BW)

EXT MOD Sensitivity:	9% to 11% V_{pk}
Supplemental Characteristic	
Rate:	100 Hz to 10 kHz
Phase Modulation	
Range:	0.1 to 10 radians peak
Resolution:	0.1 radians
Accuracy:	±5% + residual PM (1 kHz rate, GEN1, GEN2, EXT MOD) ±15% + residual PM (DTMF GEN)
EXT MOD Sensitivity:	2 rad/V_{pk} ±10%
Supplemental Characteristic	
Rate:	100 Hz to 6 kHz

AUDIO/DATA GENERATORS

A.F. Generator #1	
Frequency Range:	5 Hz to 20 kHz (sine wave only) 5 Hz to 10 kHz (other wave shapes)
Frequency Resolution:	0.1 Hz
Frequency Accuracy:	*Same as Master Oscillator ±0.1 Hz.*
Output Range (High Lvl):	0.01 to 2.5 V_{pk} (into 150 Ω)
Output Resolution (High Lvl):	0.01 V_{pk}
Output Accuracy (High Lvl):	±3% full range ±5 mV_{pk} (≤10 kHz, ≥0.03 V_{pk}) ±7% full range ±5 mV_{pk} (>10 kHz, ≥0.03 V_{pk})
Output Range (Low Lvl):	0.1 to 250 mV_{pk} (into 150 Ω)
Output Resolution (Low Lvl):	0.1 mV
Output Accuracy (Low Lvl):	±4% full range ±0.25 mV_{pk} (≤10 kHz, 0.03 V_{pk} <level ≥1 mV_{pk}) ±7% full range ±0.25 mV_{pk} (>10 kHz, 0.03 V_{pk} <level ≥1 mV_{pk})

THD:	<0.7% (1 kHz sine wave, 2.5 V_{pk}, 150 Ω Load) <1% (all other frequencies and levels)
Wave Shape:	Sine, Ramp, Square, Triangle

A.F. GENERATOR #2

Frequency Range:	1 kHz (sine wave)
Frequency Accuracy:	±0.2 Hz
Output Range (High Lvl):	0.01 to 2.5 V_{pk} (into 150 Ω)
Output Resolution (High Lvl):	0.01 V_{pk}
Output Accuracy (High Lvl):	±3% full range ±5 mV_{pk} (≥0.03 V_{pk})
Output Range (Low Lvl):	1 to 250 mV_{pk} (into 150 Ω)
Output Resolution (Low Lvl):	1 mV
Output Accuracy (Low Lvl):	±4% full range ±0.25 mV_{pk} (0.03 V_{pk} <level ≥1 mV_{pk})

DTMF GENERATOR

Output Range (High Lvl):	0.01 to 2.5 V_{pk} (into 150 Ω)
Output Resolution (High Lvl):	0.01V_{pk}
Output Accuracy (High Lvl):	±10% full range ±5 mV_{pk} (≥0.03 V_{pk})
Output Range (Low Lvl):	0.1 to 25 mV_{pk} (into 150 Ω)
Output Resolution (Low Lvl):	0.1 mV
Output Accuracy (Low Lvl):	±10% full range ±0.25 mV_{pk} (0.03 V_{pk} <level ≥1 mV_{pk})
Modes:	Continuous, Single Shot

Supplemental Characteristics

Digits:	16 (0-9, *, #, A, B, C, D)
Mark/Space Timing:	25 to 999 ms
Mark/Space Timing Resolution:	1 ms

Mark/Space Accuracy:	±20%

RECEIVER

Frequency

Range:	250 kHz to 999.9999 MHz
Resolution:	100 Hz

Supplemental Characteristic

Tunable Range:	Tunable from 100 Hz to 999.9999 MHz (characteristics below 250 kHz are not specified)
Sensitivity:	2 µV (10 dB SINAD, >2 MHz, 1 kHz tone, 3.3 kHz deviation, 15 kHz IF BW, C-Message weighted filter, 10 kHz FM deviation meter range, 15°C≤ to ≤35°C) ≤2.5 µV otherwise
Antenna Input Protection:	10 W CW (5 sec with alarm)
Selectivity:	300 kHz, 15 kHz

Supplemental Characteristic

Adjacent Channel Rejection:

RX BW (3.0 dB)	>30.0 dB Down
300 kHz	±485 kHz
15 kHz	±15 kHz

Demodulation Output

FM:	0.20 V_{pk}/kHz ±10% (10 kHz range) 0.10 V_{pk}/kHz ±10% (20 kHz range) 0.04 V_{pk}/kHz ±10% (50 kHz range) 0.02 V_{pk}/kHz ±10% (100 kHz range)
AM:	1.13 ±0.06 Vrms (80% modulation)
ΦM:	0.2 V_{pk}/Rad ±10%

SELECTIVE RF COUNTER

Frequency Range:	250 kHz to 999.9999 MHz (The received frequency must be within the IF bandpass of the COM-120B.)

Supplemental Characteristic

Tunable Range:	100 Hz to 999.9999 MHz (characteristics below 250 kHz are not specified)
Resolution:	1Hz
Accuracy:	*Same as Master Oscillator ±2 Hz*
RF Level:	0 to 53 dBm (T/R Connector) -60 to 0 dBm (Antenna Connector)

RF FREQUENCY ERROR METER

Meter Range:	0 Hz to 100 kHz
Meter Accuracy:	*Same as Master Oscillator ±2 counts*
Meter Resolution:	1 Hz (10 sec gate time) 10 Hz (1 sec gate time)
RF Frequency Range:	250 kHz to 999.999999 MHz (The received frequency must be within the IF bandpass of the COM-120B.)
RF Level:	0 to 53 dBm (T/R Connector) -60 to 0 dBm (Antenna Connector)

AF FREQUENCY COUNTER

Frequency

Range:	10 Hz to 20 kHz
Accuracy:	*Same as Master Oscillator ±1 count*
Resolution (1 sec gate time):	0.1 Hz (1 sec gate time, 10 to 500 Hz) 1 Hz (1 sec gate time, >500 Hz to 20 kHz) 0.1 Hz (10 sec gate time)

Supplemental Characteristic

Input Signal Level

SCOPE/DVM Input:	90 mV_{pp} (50 mV range, any waveform)
AUDIO/DATA Input:	450 mV_{pp} (any waveform)

FREQUENCY MODULATION METER

Range:	10 kHz, 20 kHz, 50 kHz, 100 kHz full scale
Resolution:	10 Hz (10 kHz range) 100 Hz (20 kHz, 50 kHz, 100 kHz ranges)
Accuracy:	±5% full scale ±50 Hz ±1 count + source residual FM (300 kHz IF BW, 1 kHz tone, 5 kHz deviation, C-message weighted filter)
Modulation Rate:	0 to 20 kHz
Carrier Range:	250 kHz to 999.9999 MHz (The received frequency must be within the IF bandpass of the COM-120B.)
Carrier Level:	0 to 53 dBm (T/R Connector) -60 to 0 dBm (Antenna Connector)

ΦM METER

Range:	1, 2, 5, 10 rad peak full scale
Resolution:	0.01 rad (1 and 2 radian ranges) 0.1 rad (5 and 10 radian ranges)
Accuracy:	±5% of full scale ±0.1 rad ±1 count + source residual PM (300 kHz IF BW, 1 kHz tone, 1 rad deviation, C-message weighted filter)
Modulation Rate:	100 Hz to 6 kHz
Carrier Range:	250 kHz to 999.9999 MHz (The received frequency must be within the IF bandpass of the COM-120B.)
Carrier Level:	0 to 53 dBm (T/R Connector) -60 to 0 dBm (Antenna Connector)

AM MODULATION METER

Range:	1% to 100%
Resolution:	0.1%
Accuracy:	±5% of full scale ±1 count + source residual AM (300 kHz IF BW, 1 kHz tone, 50% AM depth, C-Message weighted filter)
Modulation Rate:	50 Hz to 10 kHz

Carrier Range:	250 kHz to 999.9999 MHz (The received frequency must be within the IF bandpass of the COM-120B.)
Carrier Level:	0 to 53 dBm (T/R Connector) -60 to 0 dBm (Antenna Connector)
Supplemental Characteristic	
AGC Attack Time:	50 ms

RF POWER METER

Meter Ranges:	2 mW to 200 W in a 1-2-5 sequence
Resolution:	1% of full scale or 0.1 mW whichever is greater
Accuracy:	±10% ±0.1 mW ±1 count (>200 mW or temperature 15°C to 3°C) ±15% ±0.1 mW ±1 count (<200 mW or 15°C < temperature ≤35°C)
Frequency Range:	1.5 to 999.9999 MHz
RF Level Range:	2 mW to 200 W average power
Supplemental Characteristic	
Usable Level:	0.2 mW to 200 W average power (characteristics below 2 mW not specified)
Operating Conditions:	50 W CW continuous (50°C) 100 W CW (90 sec/3 min, 50°C) 150 W CW (30 sec/3 min, 50°C) 200 W CW (15 sec/3 min, 50°C)
VSWR:	1.15:1 (0.25 to 100 MHz) 1.23:1 (100 to 400 MHz) 1.38:1 (>400 MHz to 999.9999 MHz)
Alarms:	Audible and visual (if applied power exceeds 200 W in the 200 W range or temperature exceeds 105°C)

RECEIVE LEVEL METER

Range:	-101 to -30 dBm (15 kHz IF BW) -80 to -30 dBm (300 kHz IF BW)

Supplemental Characteristic

Accuracy:	±3 dB
Frequency Range	250 kHz to 999.9999 MHz (The received frequency must be within the IF bandpass of the COM-120B.)

DISTORTION METER

Range:	1% to 20%
Resolution:	0.1%
Accuracy:	±0.5% distortion ±1 count (1% to 10%) ±2% distortion ±1 count (>10 to 20%)
Signal Frequency:	1 kHz

Supplemental Characteristic

Signal Level:	0.03 to 200 Vrms (SCOPE/DVM input) 0.15 to 15 Vrms (AUDIO/DATA input

SINAD METER

Range:	3 to 30 dB
Resolution:	0.1 dB
Accuracy:	±1 dB ±1 count (at 12 dB)
Signal Frequency:	1 kHz

Supplemental Characteristic

Signal Level:	0.03 to 200 Vrms (SCOPE/DVM input) 0.15 to 15 Vrms (AUDIO/DATA input)

DIGITAL VOLTMETER

Ranges:	50 mV to 200 V in a 1-2-5 sequence
Range (DC):	10 mV to 200 Vdc (SCOPE/DVM input)
(AC):	10 mV to 200 Vrms (SCOPE/DVM input) 150 mV to 15 Vrms (AUDIO/DATA input)
Meter Ranges:	50 mV to 200 V (1-2-5 sequence)
Resolution:	3.5 digit

Accuracy:	±5% full scale ±5 mV ±1 count (SCOPE/DVM input) ±7% full scale ±5 mV ±1 count (AUDIO/DATA input)
Frequency:	DC, 50 Hz to 20 kHz
Input Impedance:	1 MΩ (unbalanced, SCOPE/DVM input) 100 kΩ (unbalanced, AUDIO/DATA input)

OSCILLOSCOPE

Bandwidth (3 dB):	50 kHz
Vertical	
Ranges:	10 mV to 200 V per division (1-2-5 sequence)
Max Input Voltage:	200 V_{pk}
Accuracy:	5% full scale
Resolution:	1% full scale
Coupling:	DC, AC and GND
Supplemental Characteristic	
Resolution:	256 data points, 8 major divisions
Horizontal	
Ranges:	100 µsec to 100 ms per division (1-2-5 sequence)
Resolution:	1% full scale
Accuracy:	1% full scale
Supplemental Characteristic	
Resolution:	500 data points, 10 major divisions
Impedance:	1 MΩ, unbalanced

SPECTRUM ANALYZER

Center Frequency:	250 kHz to 999.9999 MHz
Supplemental Characteristic	
Tunable Range:	100 Hz to 999.9999 MHz (characteristics below 250 kHz are not specified)

Resolution: 100 Hz

Frequency Span

Ranges: 1 kHz to 100 MHz per division in a 1-2-5 sequence + zero span

Accuracy: ±5% of span width

Operational Modes: Normal, Split Screen

Frequency Span

Modes:

Scan Width	Resolution Bandwidth
100 MHz	3 MHz
50 MHz	3 MHz
20 MHz	3 MHz
10 MHz	3 MHz
5 MHz	300 kHz
2 MHz	300 kHz
1 MHz	300 kHz
500 kHz	30 kHz
200 kHz	30 kHz
100 kHz	30 kHz
50 kHz	30 kHz
20 kHz	3 kHz
10 kHz	3 kHz
5 kHz	3 kHz
2 kHz	300 Hz
1 kHz	300 Hz
0 kHz	30 kHz

Level

Display: Log, 2 and 10 dB per division

Vertical Resolution: 1 dB

Range (Dynamic): 60 dB

Bandwidth Switching Error: <3 dB

Log Linearity: ±2 dB (referenced to -40 dBm)
±3 dB (≤15°C, ≥35°C)

Input Attenuator: 0, 30 dB (Antenna Connector)

INPUT/OUTPUT CONNECTORS

RS-232 Connector

Operations Mode:	Off, PC (Input/Output)
Baud Rates:	100, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400
Stop Bits:	1, 2
Parity:	Odd, Even, None
Handshake:	None, Xon/Xoff, CTS/RTS

MASTER OSCILLATOR

TCXO

Frequency:	10 MHz
Uncertainty:	±0.1 PPM
Temperature Stability:	±0.2 PPM (0° to 50°C)
Aging:	±0.5 PPM/year

POWER REQUIREMENTS

Line Voltage:	90 to 135 VAC (50 to 400 Hz) 200 to 265 VAC (50 to 60 Hz)
DC Input:	12 to 30 Vdc
Power Consumption: AC:	180 W maximum
DC:	150 W maximum

Supplemental Characteristic

Power Consumption (AC):	110 W typical
Power Consumption (DC):	90 W typical

GENERAL CHARACTERISTICS

Operating Temperatures	0° to 50°C

Dimensions:	40.0 cm (15.75") wide, 19.0 cm (7.5") high, 42.9 cm (16.875") deep (without bail handle and front panel cover)
	44.0 cm (17.32") wide, 19.0 cm (7.5") high, 53.7 cm (21.125") deep (with bail handle and front panel cover)
Weight:	17.3 kg (38.5 lbs) (without options, lid, accessories)

OPTIONS

01 Internal Battery. Provides self-contained dc power.

02 0.01 PPM Oven Time Base. The oven time base replaces the standard TCXO and is recommended for customers maintaining 800/900 MHz systems.

03 30 kHz IF Filter. The 30 kHz filter is required when ordering Option 15.

04 #2 Variable Function Generator. The generator replaces the standard fixed 1 kHz generator.

05 Generate Amplifier. An internal 26 dB amplifier for those requiring additional RF output level.

07 Data Generator/BER Meter. The Data Generator/Bit Error Rate Meter is available for testing digital characteristics of transceivers.

08 SSB Receive Filter. The SSB filter is available for customers requiring the capability to monitor SSB signals.

09 RCC Signaling. Provides MTS, IMTS and Tone Remote Control signaling.

11 Audio/Digital Signaling. Provides encode/decode capability for the following formats:

CCIR	EURO	DZVEI	NATEL	EEA	CCIRH
5/6 Tone	DDZVEI	ZVEI	EIA	CCIRH	POCSAG

12 Tracking Generator. Tracking Generator and Spectrum Analyzer provide amplitude vs frequency display when sweeping cavities, duplexors, etc.

13 IEEE 488. Provides the parallel GPIB interface.

14 CLEARCHANNEL LTR®. Provides test capability for LTR repeaters and mobiles.

15 AMPS Mobile Station Test. Auto and manual test facilities to verify proper operation of AMPS mobiles, transportables and portables.

16 EDACS®. Provides test capability for EDACS repeaters and mobiles.

SECTION 2 - INSTALLATION

2-1 GENERAL

This section contains information on preparing the COM-120B for use. Also listed are installation and operating precautions for safe use of the unit.

2-2 PRECAUTIONS

Before operating this instrument, the operator should be thoroughly familiar with all aspects of this manual.

For operator safety and to prevent damage to this instrument, the following operating precautions should be observed at all times.

WARNING:

THE COM-120B MUST BE CONNECTED TO ELECTRICAL GROUND. CONNECT THE FURNISHED AC POWER CORD TO A PROPERLY GROUNDED 3-PIN RECEPTACLE. DUE TO POTENTIAL SAFETY HAZARDS, USE OF THREE-PRONG TO TWO-PRONG ADAPTOR PLUGS IS NOT RECOMMENDED.

CAUTION:

THE T/R CONNECTOR ACCEPTS NO MORE THAN 200 W. MAXIMUM OPERATION TIME FOR MEASUREMENT USING THE T/R CONNECTOR IS:

CONTINUOUS ON AT 50 W AND 50°C AMBIENT.

30 SEC ON AND 3 MIN OFF AT 100 W AND 50°C AMBIENT.

15 SEC ON AND 3 MIN OFF AT 200 W AND 50°C AMBIENT.

MAXIMUM CONTINUOUS INPUT INTO THE ANTENNA CONNECTOR MUST NOT EXCEED .25 W, OR DAMAGE TO THE COM-120B MAY RESULT.

MAXIMUM CONTINUOUS INPUT INTO THE AUX RF OUT CONNECTOR MUST NOT EXCEED 20 V, OR DAMAGE TO THE COM-120B MAY RESULT.

MAXIMUM CONTINUOUS INPUT INTO THE DEMOD CONNECTOR MUST NOT EXCEED 20 V, OR DAMAGE TO THE COM-120B MAY RESULT.

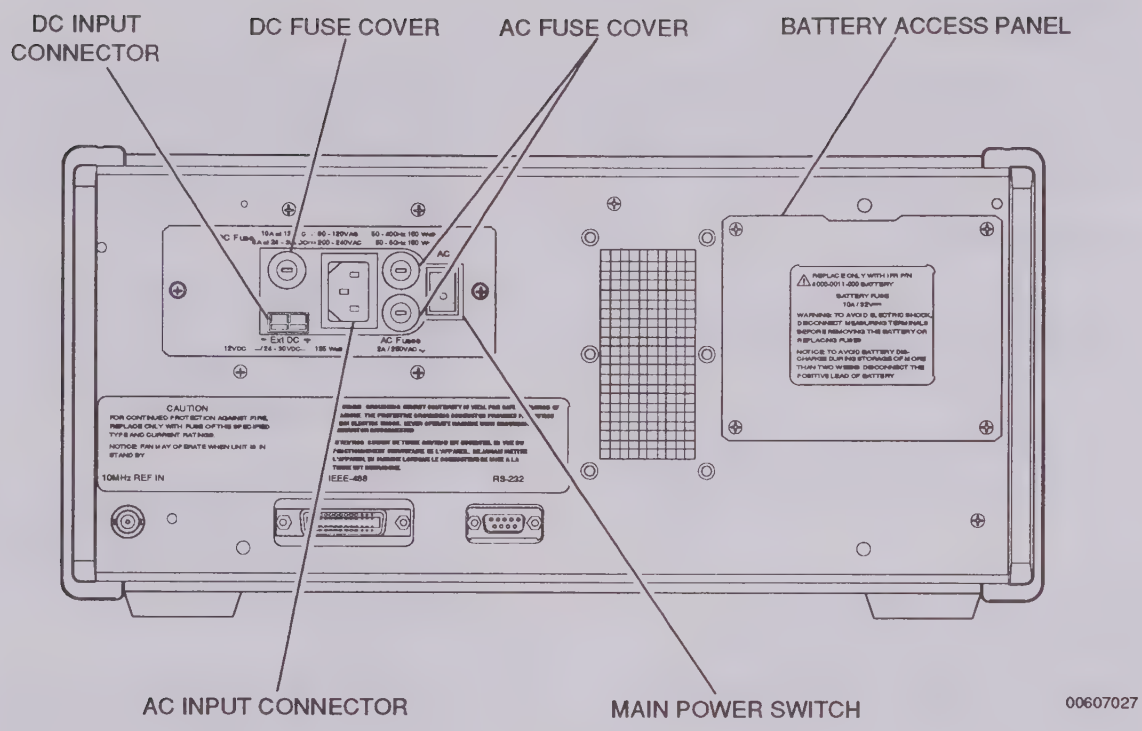
MAXIMUM CONTINUOUS INPUT INTO THE MIC/ACC CONNECTOR MUST NOT EXCEED 20 V, OR DAMAGE TO THE COM-120B MAY RESULT.

MAXIMUM CONTINUOUS INPUT INTO THE EXT MOD CONNECTOR MUST NOT EXCEED 20 V, OR DAMAGE TO THE COM-120B MAY RESULT.

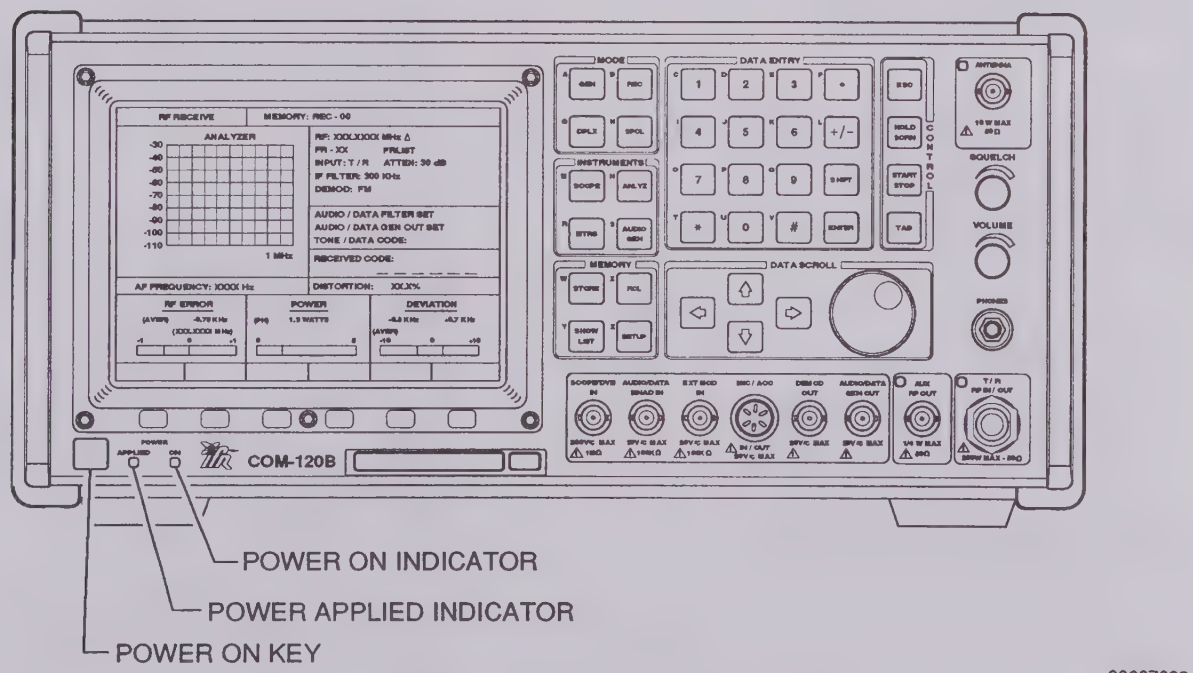
MAXIMUM CONTINUOUS INPUT INTO THE AUDIO/DATA IN CONNECTOR MUST NOT EXCEED 30 V, OR DAMAGE TO THE COM-120B MAY RESULT.

MAXIMUM CONTINUOUS INPUT INTO THE SCOPE/DVM CONNECTOR MUST NOT EXCEED 200 V, OR DAMAGE TO THE COM-120B MAY RESULT.

THIS EQUIPMENT CONTAINS PARTS SENSITIVE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD).



COM-120B Rear Panel



COM-120B Front Panel

2-3 POWER UP PROCEDURES

The Internal Battery, if installed, charges automatically whenever the COM-120B is connected to a power source and the Main Power Switch is set to ON.

The Power Supply is designed to sense applied voltage and automatically compensate with no further actions required.

2-3-1 APPLYING AC POWER

1. Insure proper fuse is installed in AC FUSE Holder.

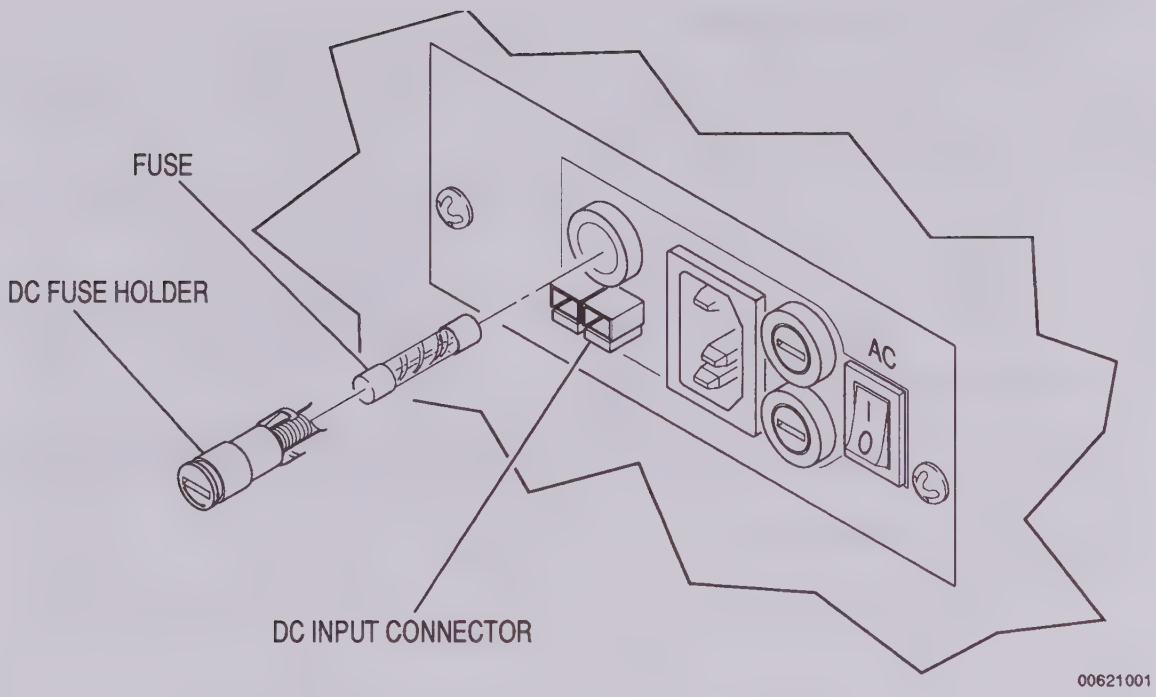
   Fuses provided include two 3 A fuses for ac operation.

2. Connect power cord to AC Input Connector.

3. Plug cord into power source. Insure proper grounding.

4. Set Main Power Switch to ON ("I" on switch). Power APPLIED Indicator lights when power is available.

5. Press COM-120B Front Panel Power ON Key to activate unit. Power ON Indicator lights.



COM-120B DC Fuse Location

2-3-2 APPLYING EXTERNAL DC POWER

1. Insure proper fuse is installed in DC FUSE Holder.

   Fuse provided:
   10 A fuse for 12 Vdc operation

2. Connect power cord to DC Input Connector.

3. Plug cord into power source. Power APPLIED Indicator lights when power is available.

4. Press COM-120B Front Panel Power ON Key to activate unit. Power ON Indicator lights.

2-3-3 BATTERY POWER OPERATION (OPTION 01)

1. Press COM-120B Front Panel Power ON Key.

2. Power ON Indicator lights.

   Option 01 required for battery operation.

   Power cycles off after approximately 10 minutes of operation.

   Flashing Power ON Indicator denotes low battery charge.

2-4 BATTERY AND BATTERY FUSE REPLACEMENT (OPTION 01)

2-4-1 BATTERY REPLACEMENT

The following procedure should be followed when replacing the battery.

WARNING:
THE BATTERY USED IS A LEAD-ACID BATTERY REQUIRING PROPER DISPOSAL FOR DISCARD OF BATTERY. REFER TO APPROPRIATE STATE AND LOCAL REGULATIONS FOR INSTRUCTIONS AS TO PROPER DISPOSITION OF DISCARD BATTERIES.

CAUTION:
REPLACE BATTERY WITH IFR PART NUMBER 4000-0000-011 BATTERY ONLY.

CAUTION:
DO NOT USE OR CONNECT A NON-RECHARGEABLE BATTERY TO THE TERMINALS. DANGER OF OVERHEAT OR FIRE.

Option 01 required for battery operation.

Internal Battery, if installed, charges automatically whenever unit is connected to a power source and Main Power Switch is set to ON.

1. Set COM-120B Main Power Switch to OFF ("0" on switch).

2. Remove all power sources from COM-120B.

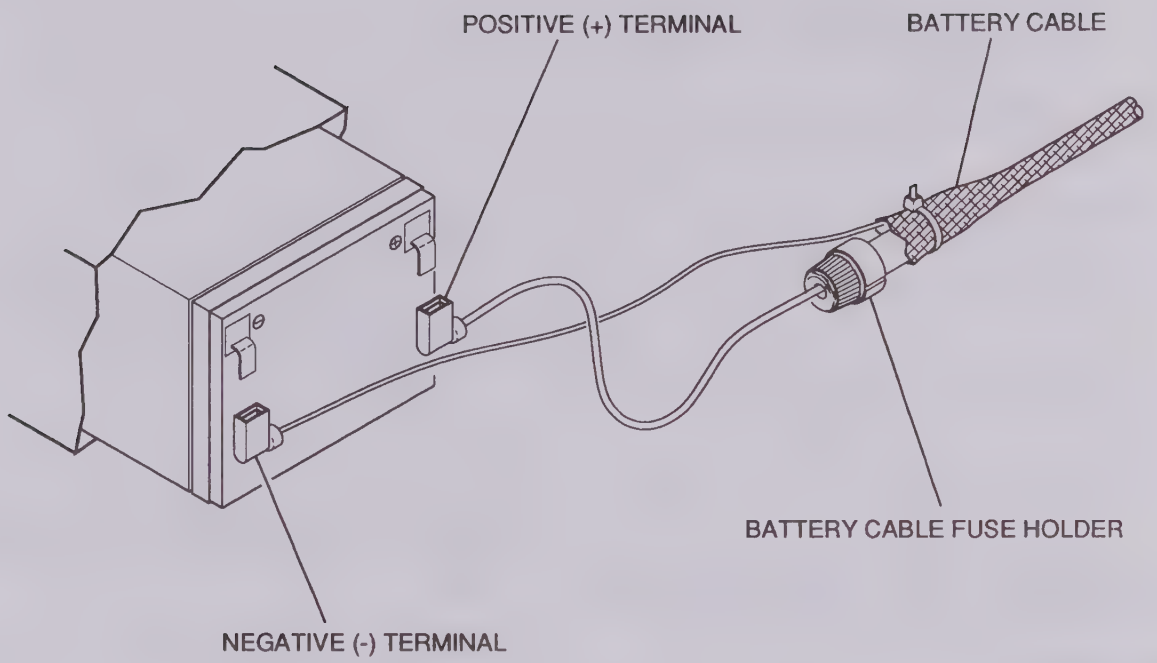
3. Loosen 4 Screws on Battery Access Panel. Remove Battery Access Panel.

4. Disconnect Positive (+) and Negative (-) Terminals from battery.

5. Remove Battery from cavity.

6. Install replacement battery in cavity.

7. Connect Positive (+) and Negative (-) Terminals to replacement battery. Install Battery Access Panel.

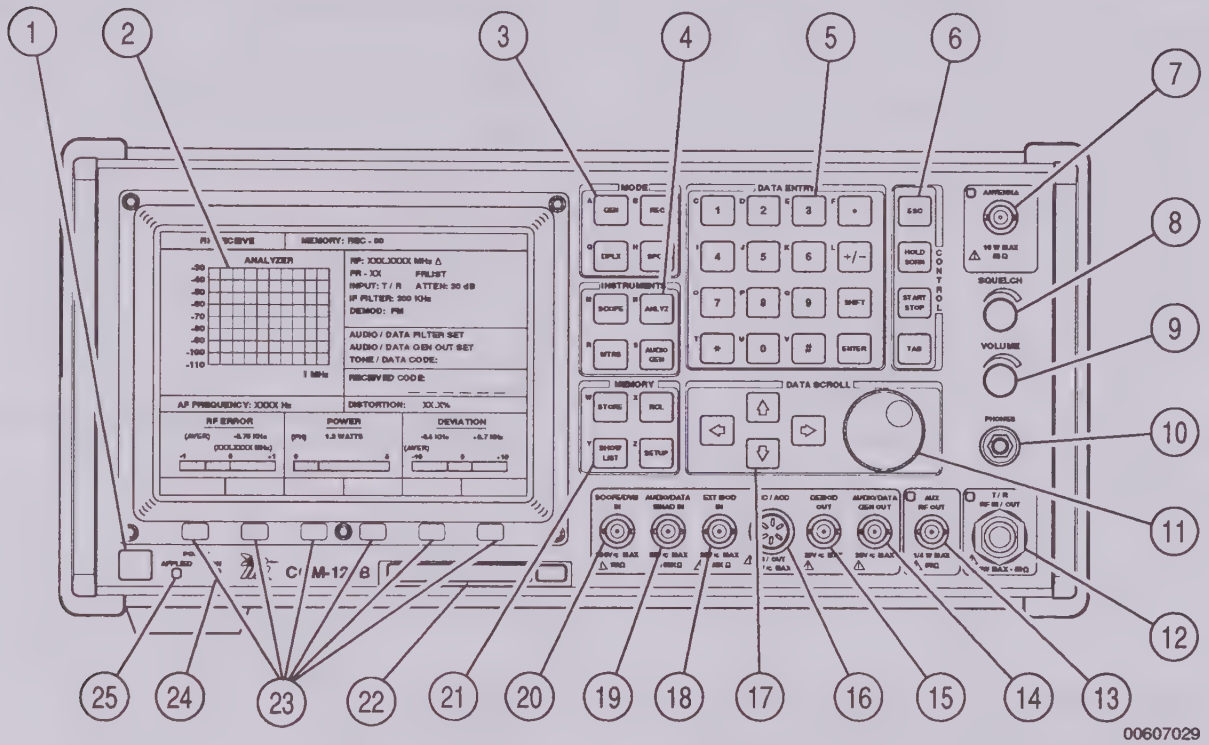


COM-120B Battery and Battery Cable

2-4-2 BATTERY FUSE REPLACEMENT

1. Set COM-120B Main Power Switch to OFF.
2. Remove all power sources from COM-120B.
3. Loosen 4 Screws on Battery Access Panel. Remove Battery Access Panel.
4. Disconnect Positive (+) and Negative (-) Terminals from battery.
5. Remove Battery from cavity.
6. Pull Battery cable out of COM-120B until Battery Fuseholder is exposed.
7. Unscrew Battery Cable Fuseholder cap. Replace fuse with 10 A Fast-Blo Fuse.
8. Feed Battery Cable into Chassis.
9. Install battery in cavity.
10. Connect Positive (+) and Negative (-) Terminals to battery. Install Battery Access Panel.

SECTION 3 - CONTROLS, CONNECTORS AND INDICATORS



COM-120B Front Panel Controls

3-1 FRONT PANEL CONTROLS

1. Power ON Key

   Selection toggles between Power APPLIED and Power ON states.

2. Display

   Provides video information of current test operation.

3. Test Mode Keys

   - GEN Test Mode Key
     Accesses GEN (Generate) Test Mode Operation Screen.
   - REC Test Mode Key
     Accesses REC (Receive) Test Mode Operation Screen.
   - DUPLEX Test Mode Key
     Accesses DUPLEX Test Mode Operation Screen.
   - SPECIAL Test Mode Key
     Accesses Optional Operation Modes.

4. Instruments Keys

   - SCOPE Key
     Accesses Oscilloscope Operation Screen.
   - ANLYZ Key
     Accesses Spectrum Analyzer Operation Screen.
   - MTRS Key
     Accesses Independent Meters Functions.

- AUDIO GEN Key
  Accesses Audio/Data Generators Functions.

5. DATA ENTRY Keys

- Numeric Keys
  Use to enter numeric (0-9) values.
- ✻ Key
  Use for DTMF functions.
- # Key
  Use for DTMF functions.
- +/- Key
  Use to set sign of entered value.
- • Key
  Use to enter decimal point in numeric values.
- SHIFT Key
  Accesses alphabetic function of Front Panel Keys.
- ENTER Key
  Selects a data field for edit or completes an editing procedure.

Front Panel Key	Shift Character
GEN	A
REC	B
1	C
2	D
3	E
+/-	F
DPLX	G
SPCL	H
4	I
5	J
6	K
•	L
SCOPE	M
ANLYZ	N
7	O
8	P
9	Q
MTRS	R
AUDIO GEN	S
✻	T
0	U
#	V
STORE	W
RCL	X
SHOW LIST	Y
SETUP	Z
TAB	[space]

6. CONTROL Keys

- ESC Key
  Use to escape an editing procedure without change to parameters.

- HOLD SCRN Key
  Use to freeze current screen for observing data. Once Hold Screen Function is activated, pressing HOLD SCRN Key returns Test Set to normal operation.

- START/STOP Key
  Use to start and stop the following Operating Functions:

Reset One Shot in Oscilloscope Operation
Bit Error Rate Meter (Option 07)
LTR® Trunking (Option 14)

- TAB Key
  Moves cursor to predetermined areas for simplifying editing.

7. ANTENNA Connector ⚠

Input connector to monitor "off-the-air" signals. Also used as a connection for low power (10 W maximum) signals.

CAUTION:
MAXIMUM CONTINUOUS INPUT INTO THIS CONNECTOR MUST NOT EXCEED 0.25 W, OR DAMAGE TO THE COM-120B MAY RESULT.

8. SQUELCH Control

Adjusts squelch level of received signal.

9. VOLUME Control

Controls volume of speaker.

10. PHONES Connector

Provides access for using Headphones when audio signal is provided to speaker.

11. DATA SCROLL Spinner

Allows operator to scroll through current test mode operation screen, scroll through lists of parameter selections and actively increase and decrease one digit of numeric parameters. Current test mode operation screen changes with entered data; changed parameter will not become current default unless ENTER Key is pressed. Pressing ESC Soft Function Key returns changed parameter to previous setting.

12. T/R Connector ⚠

50 Ω Connector for high power input or output signals.

CAUTION:
MAXIMUM CONTINUOUS INPUT INTO THIS CONNECTOR MUST NOT EXCEED 200 W, OR DAMAGE TO THE COM-120B MAY RESULT.

13. AUX RF OUT Connector ⚠

50 Ω Auxiliary output connector for RF Signals.

CAUTION:
MAXIMUM CONTINUOUS INPUT INTO THIS CONNECTOR MUST NOT EXCEED 0.25 W, OR DAMAGE TO THE COM-120B MAY RESULT.

14. AUDIO/DATA GEN Connector ⚠

600 Ω connector for output of audio and data generators. Access is selectable from individual generator setup screens.

CAUTION:
MAXIMUM CONTINUOUS INPUT INTO THIS CONNECTOR MUST NOT EXCEED 20 V, OR DAMAGE TO THE COM-120B MAY RESULT.

15. DEMOD Connector ⚠

600 Ω connector for output of demodulated signals. Access is selectable from individual generator setup screens.

CAUTION:
MAXIMUM CONTINUOUS INPUT INTO THIS CONNECTOR MUST NOT EXCEED 20 V, OR DAMAGE TO THE COM-120B MAY RESULT.

16. MIC/ACC Connector ⚠

Provides access for microphone or accessory equipment. Both generate and receive lines are available.

CAUTION:
MAXIMUM CONTINUOUS INPUT INTO THIS CONNECTOR MUST NOT EXCEED 20 V, OR DAMAGE TO THE COM-120B MAY RESULT.

17. DATA SCROLL Keys

Allows operator to scroll through current test mode operation screen, scroll through list of parameter selections and actively increase and decrease one digit of numeric parameters. Increasing and decreasing digits affects higher digits in parameter. Current test mode operation screen changes with changed data; changed parameter will not become current default unless ENTER Key is pressed. Pressing ESC (Escape) Soft Function Key returns changed parameter to previous setting.

18. EXT MOD Connector ⚠

100 kΩ connector allows input for external modulation source.

CAUTION:
MAXIMUM CONTINUOUS INPUT INTO THIS CONNECTOR MUST NOT EXCEED 20 V, OR DAMAGE TO THE COM-120B MAY RESULT.

19. AUDIO/DATA IN Connector ⚠

100 kΩ connector allows input of external audio and data signals.

CAUTION:
MAXIMUM CONTINUOUS INPUT INTO THIS CONNECTOR MUST NOT EXCEED 30 V, OR DAMAGE TO THE COM-120B MAY RESULT.

20. SCOPE/DVM Connector ⚠

1 MΩ input to Oscilloscope and Digital Voltmeter.

CAUTION:
MAXIMUM CONTINUOUS INPUT INTO THIS CONNECTOR MUST NOT EXCEED 200 V, OR DAMAGE TO THE COM-120B MAY RESULT.

21. MEMORY Keys

- STORE Key
  Selection allows operator to store current Operation Screen and all current parameters for future access.
- RECALL Key
  Selection allows operator to recall previously stored Operation Screens.
- SHOW LIST Key
  Provides access to menu of all storage lists.
- SETUP Key
  Provides access to setup menu for system information and system configuration.

22. PCMIA Card Slot

Provides access to enhance software capability.

23. Soft Function Keys

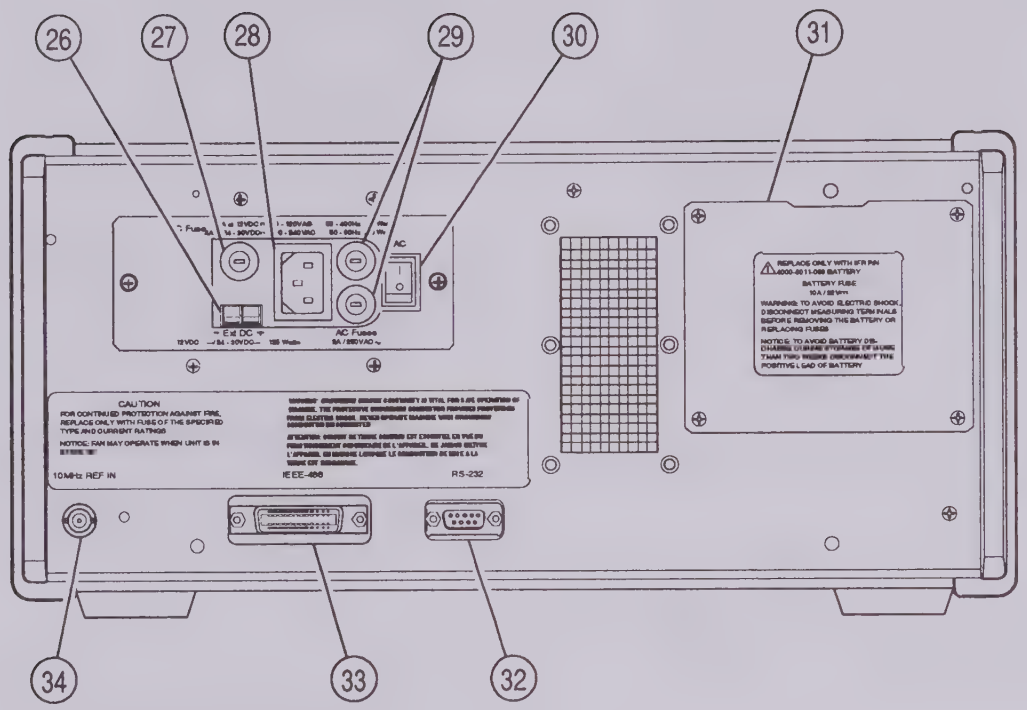
Provides access to defined function.

24. Power ON Indicator

Denotes system is on when lit.

25. Power APPLIED Indicator

Denotes power is provided to the system when lit.



COM-120B Rear Panel Controls

3-2 REAR PANEL CONTROLS

26. DC Input Connector ⚠

Accepts dc power cord to supply dc power (12 to 30 Vdc) to COM-120B.

27. DC Fuse ⚠

10 A 32 V Slo-Blo Fuse is provided for dc operation.

28. AC Input Connector ⚠

Accepts ac power cord to supply ac power (90 to 265 VAC) to COM-120B.

29. AC Fuse ⚠

Two 2 A fuses are provided for ac operation.

30. Main Power Switch ⚠

Switches power applied ON an OFF.

31. Battery Access Panel

Provides access to battery.

32. RS-232 Connector

Provides serial interface for remote operations with COM-120B.

33. GPIB Connector (Option)

IEEE-488 Connector provides parallel interface for remote operations with COM-120B.

34. Reference Connector

Provides connection for input of external 10 MHz Reference Signal.

3-3 OPERATION SCREENS AND MENUS

3-3-1 RF GENERATE OPERATION SCREEN

The RF Generate Operation Screen is used to define and activate the COM-120B RF Generator. The RF Generate Operation Screen is accessed by pressing the GEN Test Mode Key. The RF Generate Operation Screen displays in the configuration last used.

Due to the level of detail required to fully describe the RF Generate Operation Screen, information is split by function into sections. The first section covers the overall screen.

A. RF Generate General Operation Screen

B. Modulation Source Block

C. Audio/Data Filters Block

D. SINAD Meter

E. Distortion Meter

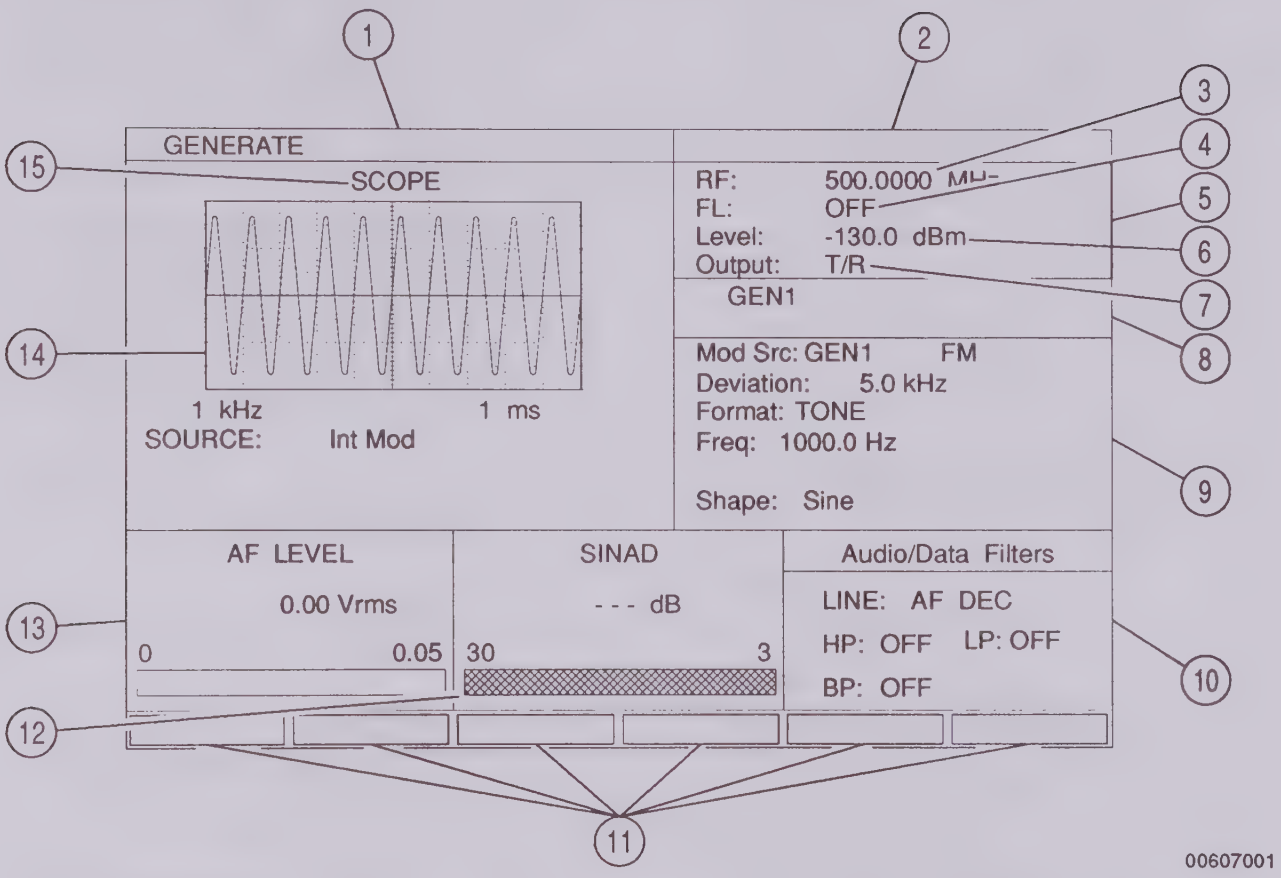
F. Audio Frequency Level (AF LVL) Meter

G. Oscilloscope Operation Screen

H. Spectrum Analyzer Operation Screen

I. Store and Recall Operation

A. RF GENERATE GENERAL OPERATION SCREEN



RF Generator Operation Screen

1. Header Bar

Displays current operation mode.

2. RF Field

Displays current RF Generate Frequency from 0.0000 to 1000.0000 MHz.

Soft Function Keys available with this function include:

F1 Δ=
Accesses window to set RF Field change increment (Δ Freq). With Δ= active, Soft Function Keys are defined as follows:

F6 RETURN
Closes window and returns to normal operation.

F2 Δ On/Off
Toggles Δ Function OFF and ON. If Δ Function is active, "Δ" is displayed by Frequency Readout.

F3 SET REF
Changes frequency in current RF Field to reference frequency. RF Field displays offset from reference frequency when activated. If Set Reference

Function is active, "R" is displayed.

F4 SWEEP
Accesses menu to configure COM-120B RF Generator to sweep specified frequency range. If Sweep Operation is active, Sweep Prompt is displayed.

Set Reference Function and Sweep Function cannot be active simultaneously.

With Sweep Function active, Soft Function Keys are defined as follows:

F1 START
Activates Sweep Function in continuous loop.

F2 STOP
Stops Sweep Function.

F3 SINGLE
Activates Sweep Function for one pass through frequency range.

F5 RESUME
Restarts Sweep Function after STOP Soft Function Key F2 is pressed.

F6 RETURN
Exits Sweep Function into normal RF Generate operation.

F5 LOCK/UNLOCK
Sets frequency used for Receive Operation and Spectrum Analyzer Operation to same frequency as current RF Field. If LOCK Function is active, "L" is displayed and UNLOCK is displayed for F5 definition. Pressing F5, when UNLOCK is displayed, toggles LOCK Function OFF. Editing Frequency in any Operation Screen is reflected in all three Operation Screens when Lock Function is engaged.

3. FL (Frequency List) Setting

Displays selected Frequency List number (FL-00 to FL-99) when active. Blank if inactive. RF Field (3) echoes frequency of selected Frequency List setting. Editing RF Field (3) deactivates Frequency List Function.

Soft Function Keys available with this function include:

F1 On/Off
Toggles active function On and Off.

F2 T-Fwd
Accesses Trunking-Forward Channel List.

F3 T-Rvs
Accesses Trunking-Reverse Channel List.

F4 C-Fwd
Accesses Cellular-Forward Channel List.

F5 C-Rvs
Accesses Cellular-Reverse Channel List.

F6 FL
Accesses User Defined Frequency List.

4. Frequency List Label

Displays optional Frequency List Label. Blank if Frequency List Label is not used.

5. Output Level

Displays Output Level in selected units. If T/R Connector is selected for Output (7), range is -130 to -20 dBm, .07 to 22360.6 µV, 0.0000 to 22.3606 mV and 0.000000 to 0.022360 V. If AUX RF Connector is selected for Output (7), range is -130 to -13 dBm, .07 to 50059.3 µV, 0.0000 to 50.0593 mV and 0.000000 to 0.050059 V.

Soft Function Keys available with this function include:

F1 dBm
Sets Output Level Units to dBm.

F2 uV
Sets Output Level Units to µV.

F3 mV
Sets Output Level Units to mV.

F4 V
Sets Output Level Units to V.

F5 SINAD=
Access field to set SINAD Search Function value.

F6 S=On/Off
Toggles SINAD Search Function ON and OFF. SINAD Search Function changes Output Level to search for SINAD= value from UUT. S= Prompt is displayed with function ON.

6. Output

Displays connector selected for output. Displays T/R, T/R Gate, AUX or AUX Gate. If Gate Output is selected, output is active only when microphone attached to MIC/ACC Connector is keyed. Default output connector is T/R Connector.

Soft Function Keys available with this function include:

F1 T/R
Selects T/R Connector as output connector with T/R Connector Indicator lit.

F2 AUX
Selects AUX RF OUT Connector as output connector with AUX RF OUT Connector Indicator lit.

F3 T/R Gate
Selects T/R Connector as output connector with T/R Connector Indicator lit. Output is active only when microphone attached to MIC/ACC Connector is keyed.

F4 AUX Gate
Selects RF AUX Connector as output connector with AUX RFOUT Connector Indicator lit. Output is active only when microphone attached to MIC/ACC Connector is keyed.

7. Modulation Source Window

Displays active Modulation Sources. Inactive Modulation Sources are not shown. If two (or more) sections of the RF Modulator are set in conflict (e.g. GEN1 set for PM and GEN2 set for FM, or GEN1 set for 0.01 kHz deviation and GEN2 set for 2.60 kHz deviation) the screen displays the invalid source grayed out.

8. Modulation Source Block

Displays selected Modulation Source and appropriate data. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator), DATA (DATA Generator), EXT (External Modulation) and MIC (Microphone Modulation).

9. AUDIO/DATA FILTERS Block

Displays current filter information for selected analog signal. Selections include AF Decode Line, Data Decode Line and Speaker/Headphones Line.

10. Soft Function Key Definitions

Functions are redefined with each field of the current operation screen.

11. SINAD/Distortion Meters

Displays selected Meter Operation. Selections are SINAD or Distortion Meters.

Soft Function Keys available with this function include:

F1 ZOOM
Expands current meter into full-size meter.

F2 SINAD
Selects SINAD Meter as active meter. Not displayed if meter is active.

F3 DIST
Selects Distortion Meter as active meter. Not displayed if meter is active.

12. AF LVL METER

Displays AF LEVEL METER Operation.

Soft Function Keys available with this function include:

F1 ZOOM
Expands current meter into full-size meter.

13. OSCILLOSCOPE Sweep

Displays editable Oscilloscope Sweep. Available selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

Soft Function Keys available with this function include:

F1 MENU
Displays a pop up menu with Scope Sweep selections.

F2 RETURN
Exits Menu into normal operation.

F2 ROLL
Views the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.

F2 SLOW
Returns to the normal mode of operation.

14. SOURCE

Displays editable Oscilloscope Source. Available selections include:

Scope/DVM - GND
Scope/DVM - AC
Scope/DVM - DC
Ext Mod
Int Mod
Audio/Data In
Notch Residual

Soft Function Keys available with this function include:

F1 MENU
Displays a pop up menu with Source selections. Soft Function Keys available include:

F2 RETURN
Exits Menu into normal operation.

14a. OSCILLOSCOPE Scale

Displays editable Oscilloscope Vertical Scale. Vertical Scale value and range selections is dependent on Source. Scales available include:

For Scope/DVM - Gnd, AC, DC:

10 mV	20 mV	50 mV
100 mV	200 mV	500 mV
1 V	2 V	5 V
10 V	20 V	50 V

For Ext Mod and Audio/Data In:

100 mV	200 mV	500 mV
1 V	2 V	5 V

For Int Mod:

0.2 kHz	0.4 kHz	1 kHz
2 kHz	4 kHz	10 kHz

For Notch Residual:

0.02	0.04	0.10
0.20	0.40	1.00

Soft Function Keys available with this function include:

F1 MENU
Displays a pop up menu with Vertical Scale selections.

F2 RETURN
Exits Menu into normal operation.

14b. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

15. SCOPE/ANALYZER PROMPT

Displays current operation function. Used to toggle between two functions.

Soft Function Keys available with this function include:

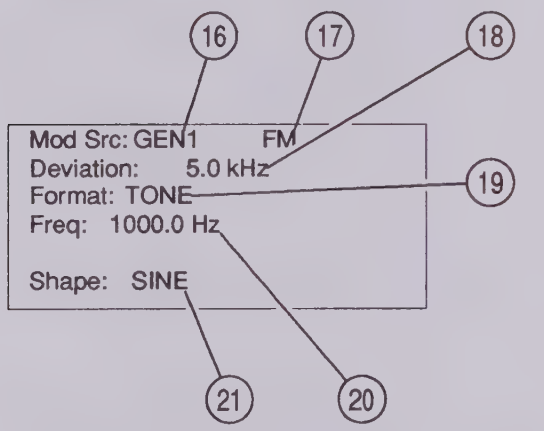
F1 ZOOM
Accesses expanded version of active function.

F2 ANALY/SCOPE
Accesses inactive function. If SCOPE is active, displays ANALY. If ANALYZER is active, displays SCOPE.

B. MODULATION SOURCE BLOCK

The Modulation Source Block displays selected Modulation Source and appropriate data. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator), DATA (DATA Generator), EXT (External Modulation) and MIC (Microphone Modulation). The Modulaton Source Block contains different information for each Modulation Source.

With GEN1 selected as Modulation Source, the Modulation Source Block is defined as follows:



16. Modulation Source

Displays selected Modulation Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator), DATA (DATA Generator), EXT (External Modulation) and MIC (Microphone Modulation).

Soft Function Keys available with this function include:

F1 GEN1
Accesses Audio Generator 1 parameters.

F2 GEN2
Accesses Audio Generator 2 parameters.

F3 DATA
Accesses DATA Generator parameters.

F4 DTMF
Accesses DTMF Generator parameters.

F5 EXT
Accesses External Modulation parameters.

F6 MIC
Accesses MIC Modulation parameters.

17. Modulation Type

Displays selected Modulation Type. Selections include OFF, AM, FM and PM.

Soft Function Keys available with this function include:

F1 OFF
Turns Modulation Source (16) OFF.

F2 AM
Selects AM as Modulation Type for Modulation Source (16).

F3 FM
Selects FM as Modulation Type for Modulation Source (16).

F4 PM
Selects PM as Modulation Type for Modulation Source (16).

18. Deviation/Modulation Level

Displays selected Deviation in kHz if current Modulation Type (17) is FM with range from 0.00 to 100 kHz. Displays selected Percent Modulation if current Modulation Type (17) is AM with range from 0.0% to 100%. Displays selected Deviation in radians if current Modulation Type (17) is PM with range from 0.00 to 10 Radians. Field is not displayed if Modulation Type (17) is OFF.

19. Format

Displays Format type for GEN1 Modulation Source (16). Selections available with standard COM-120B include:

TONE
USER

Additional selections are shown, but are unusable unless Option 09 or Option 11 is installed. Additional selections available include:

TONE	CCIRH
TONE REMOTE	CCIRH4
USER	NATEL
EEA	EURO
EIA	5/6 TONE
ZVEI	10 PS
DZVEI	20 PS
DDZVEI	MTS
CCIR	

Soft Function Keys available with GEN1 include:

F1 MENU
Accesses menu for selecting Format.

F2 CONT
Activates continuous transmission of selected signal.

F3 BURST
Activates single transmission of selected signal. If TONE is selected as format, activates tone of duration specified by TIME Soft Function Key F4.

Additional Soft Function Keys available when USER is selected as Format include:

F4 CONFIG
Accesses Configuration Window for configuring User Selectable Frequency and Duration for codes 0 through 9 and A through T. With Configuration Window active, Soft Function Keys are defined as follows:

F1 PG UP
Used to scroll up through Configuration Window.

F2 PG DN
Used to scroll down through Configuration Window.

F3 FILL
Fills remainder of selected column with value of current cursor position.

F6 RETURN
Exits Configuration Window into normal RF Generate operation.

Additional Soft Function Keys available when TONE is selected as Format include:

F4 TIME
Accesses Window for setting BURST Function duration. Duration ranges from 0 to 30 seconds. With Configuration Window active Soft Function Keys are defined as follows:

F6 RETURN
Exits Time Window into normal RF Generate operation.

20. Tone Freq

Displays selected Audio Tone Frequency of current Modulation Source.

21. Shape

Displays selected Wave Shape of Modulation Source. Selections include SINE, SQUARE, RAMP and TRIANGLE. Active only with TONE selected as Format (19).

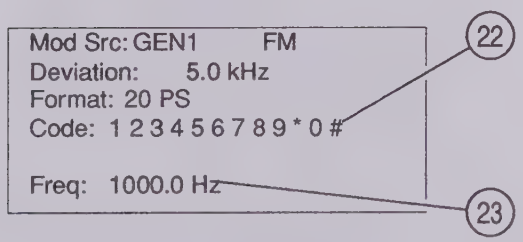
Soft Function Keys available with this function include:

F1 SINE
Selects SINE as active Wave Shape.

F2 RAMP
Selects RAMP as active Wave Shape.

F3 TRIANGLE
Selects TRIANGLE as active Wave Shape.

F4 SQUARE
Selects SQUARE as active Wave Shape.



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22. Code

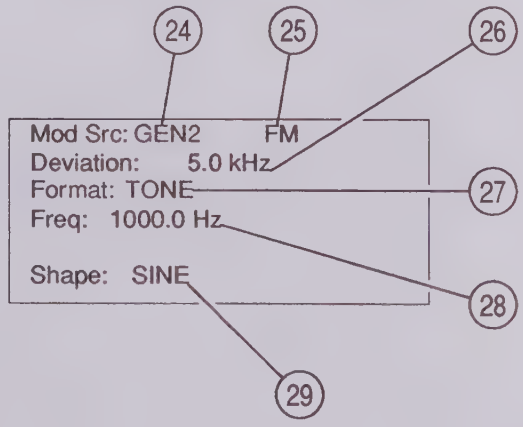
Displays selected code for specified Format (19). Not used with TONE as Format (19).

F1 CLEAR
Clears current CODE entry.

23. Pulse Freq

Displays selected Pulse Frequency of 10 PS and 20 PS settings for Format (19). Displayed only with Option 09 installed.

With GEN2 selected as Modulation Source, the Modulation Source Block is defined as follows:



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24. Modulation Source

Displays selected Modulation Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator), DATA (DATA Generator), EXT (External Modulation) and MIC (Microphone Modulation).

Soft Function Keys available with this function include:

F1 GEN1
Accesses Audio Generator 1 parameters.

F2 GEN2
Accesses Audio Generator 2 parameters.

F3 DATA
Accesses DATA Generator parameters.

F4 DTMF
Accesses DTMF Generator parameters.

F5 EXT
Accesses External Modulation parameters.

F6 MIC
Accesses MIC Modulation parameters.

25. Modulation Type

Displays selected Modulation Type. Selections include OFF, AM, FM and PM.

Soft Function Keys available with this function include:

F1 OFF
Turns Modulation Source (24) OFF.

F2 AM
Selects AM as Modulation Type for Modulation Source (24).

F3 FM
Selects FM as Modulation Type for Modulation Source (24).

F4 PM
Selects PM as Modulation Type for Modulation Source (24).

26. Deviation/Modulation Level

Displays selected Deviation in kHz if Modulation Type (25) is FM with range from 0.00 to 100 kHz. Displays selected Percent Modulation if Modulation Type (25) is AM with range from 0.0 to 100%. Displays selected Deviation in radians if Modulation Type (25) is PM with range from 0.00 to 10 Radians. Field is not displayed if Modulation Type (25) is OFF.

27. Format

Displays Format type for Modulation Source (24). Selections for standard GEN2 are limited to TONE.

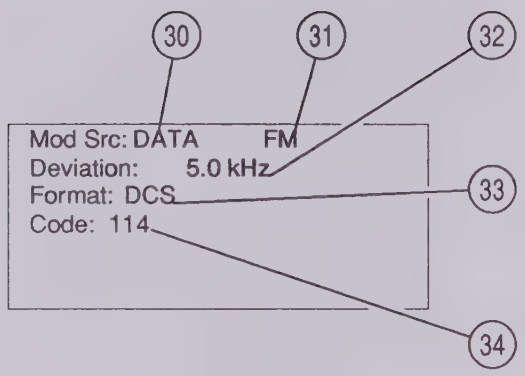
28. Tone Freq

Displays selected Audio Tone Frequency of current Modulation Source. Standard GEN2 is limited to 1 kHz tone.

29. Shape

Displays selected Wave Shape of Modulation Source. Limited to SINE only with standard GEN2.

With DATA selected as Modulation Source, the Modulation Source Block is defined as follows:



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30. Modulation Source

Displays selected Modulation Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator), DATA (DATA Generator), MIC (Microphone Modulation) and EXT (External Modulation).

Soft Function Keys available with this function include:

F1 GEN1
Accesses Audio Generator 1 parameters.

F2 GEN2
Accesses Audio Generator 2 parameters.

F3 DATA
Accesses DATA Generator parameters.

F4 DTMF
Accesses DTMF Generator parameters.

F5 EXT
Accesses External Modulation parameters.

F6 MIC
Accesses MIC Modulation parameters.

31. Modulation Type

Displays selected Modulation Type. Selections include OFF, AM, FM and PM.

Soft Function Keys available with this function include:

F1 OFF
Turns Modulation Source (30) OFF.

F2 AM
Selects AM as Modulation Type for Modulation Source (30).

F3 FM
Selects FM as Modulation Type for Modulation Source (30).

F4 PM
Selects PM as Modulation Type for Modulation Source (30).

32. Deviation/Modulation Level

Displays selected Deviation in kHz if current Modulation Type (31) is FM with range from 0.00 to 100 kHz. Displays selected Percent Modulation if current Modulation Type (31) is AM with range from 0.0% to 100%. Displays selected Deviation in radians if current Modulation Type (31) is PM with range from 0.00 to 10 Radians. Field is not displayed if Modulation Type (31) is OFF.

33. Format

Displays Format type for Modulation Source (30). Selections available with DATA include DCS and DCS/ (DCS Inverted).

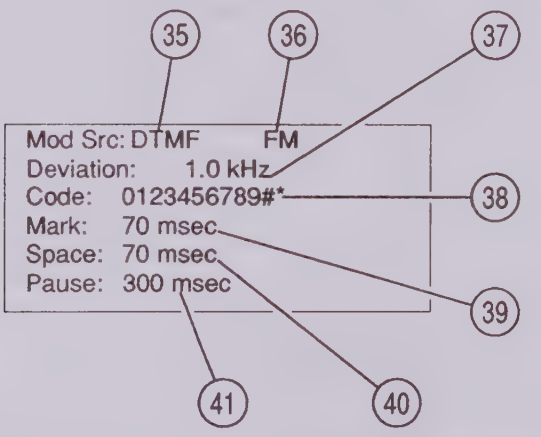
Soft Function Keys available with this function include:

F1 Menu
Accesses menu for selecting Format.

34. Code

Displays selected code for DATA Modulation Source.

With DTMF selected as Modulation Source, the Modulation Source Block is defined as follows:



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35. Modulation Source

Displays selected Modulation Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator), DATA (DATA Generator), EXT (External Modulation) and MIC (Microphone Modulation).

Soft Function Keys available with this function include:

F1 GEN1
Accesses Audio Generator 1 parameters.

F2 GEN2
Accesses Audio Generator 2 parameters.

F3 DATA
Accesses DATA Generator parameters.

F4 DTMF
Accesses DTMF Generator parameters.

F5 EXT
Accesses External Modulation parameters.

F6 MIC
Accesses MIC Modulation parameters.

36. Modulation Type

Displays selected Modulation Type. Selections include OFF, AM, FM and PM.

Soft Function Keys available with this function include:

F1 OFF
Turns Modulation Source (35) OFF.

F2 AM
Selects AM as Modulation Type for Modulation Source (35).

F3 FM
Selects FM as Modulation Type for Modulation Source (35).

F4 PM
Selects PM as Modulation Type for Modulation Source (35).

37. Deviation/Modulation Level

Displays selected Deviation in kHz if current Modulation Type (36) is FM with range from 0.00 to 100 kHz.

Displays selected Percent Modulation if current Modulation Type (36) is AM with range from 0.0% to 100%. Displays selected Deviation in radians if current Modulation Type (36) is PM with range from 0.00 to 10 Radians. Field is not displayed if Modulation Type (36) is OFF.

38. Code

Displays selected code for DTMF Modulation Source.

Soft Function Keys available with this function include:

F1 CLEAR
Clears code field of current data.

F2 CONT
Activates selected DTMF Code in repeating loop.

F3 BURST
Activates selected DTMF Code for one tone sequence.

F4 KEY
Configures DATA ENTRY Keys as DTMF keypad. Code Field displays press key and DTMF Generator produces specified DTMF Code.

39. Mark Time

Displays selected Mark Time for DTMF tones. Value range: 10 to 999 ms

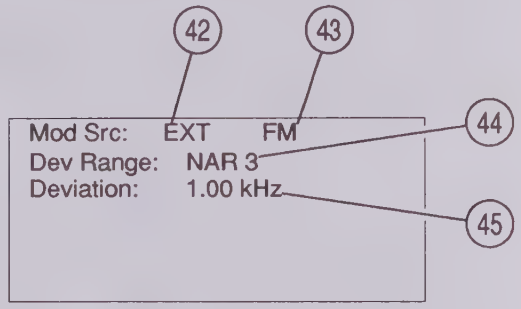
40. Space Time

Displays selected Space Time between DTMF tones. Value range: 1 to 999 ms.

41. Pause Time

Displays selected Pause Time between DTMF tone sequences for continuous transmission. Value range: 1 to 999 ms.

With EXT selected as Modulation Source, the Modulation Source Block is defined as follows:



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42. Modulation Source

Displays selected Modulation Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator), DATA (DATA Generator), EXT (External Modulation) and MIC (Microphone Modulation).

Soft Function Keys available with this function include:

F1 GEN1
Accesses Audio Generator 1 parameters.

F2 GEN2
Accesses Audio Generator 2 parameters.

F3 DATA
Accesses DATA Generator parameters.

F4 DTMF
Accesses DTMF Generator parameters.

F5 EXT
Accesses External Modulation parameters.

F6 MIC
Accesses MIC Modulation parameters.

43. Modulation Type

Displays selected Modulation Type. Selections include OFF, AM, FM and PM.

Soft Function Keys available with this function include:

F1 OFF
Turns Modulation Source (42) OFF.

F2 AM
Selects AM as Modulation Type for Modulation Source (42).

F3 FM
Selects FM as Modulation Type for Modulation Source (42).

F4 PM
Selects PM as Modulation Type for Modulation Source (42).

44. Deviation Range

Displays selected Deviation Range for External FM Modulation. Selections include NAR 3, NAR 2, NAR 1 and WIDE.

Soft Function Keys available with this function include:

F1 NAR 3
Selects Deviation Range (47a) to NAR 3, <2 kHz.

F2 NAR 2
Selects Deviation Range (47a) to NAR 2, 2 to 12.75 kHz.

F3 NAR 1
Selects Deviation Range (47a) to NAR 1, 12.75 to 25 kHz.

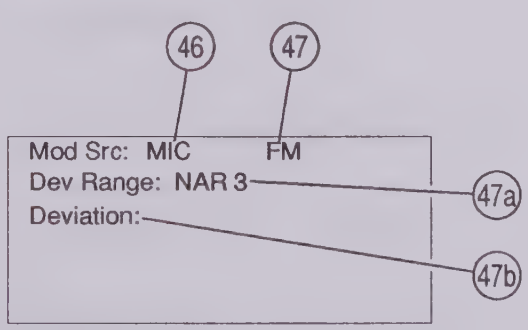
F4 WIDE
Selects Deviation Range (47a) to WIDE, >25 kHz.

45. Deviation/Modulation Level

Displays External Deviation in kHz if current Modulation Type (43) is FM with range from 0.00 to 100 kHz. Displays Percent Modulation if current Modulation Type (43) is AM with range from 0.0% to 100%. Displays Deviation in radians if current Modulation Type (43) is PM with range from 0.00 to 10 Radians. Field is not displayed if Modulation Type (43) is OFF.

Displayed Deviation/Modulation Level is valid only with sine wave input.

With MIC selected as Modulation Source, the Modulation Source Block is defined as follows:



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46. Modulation Source

Displays selected Modulation Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator), DATA (DATA Generator), EXT (External Modulation) and MIC (Microphone Modulation).

Soft Function Keys available with this function include:

F1 GEN1
Accesses Audio Generator 1 parameters.

F2 GEN2
Accesses Audio Generator 2 parameters.

F3 DATA
Accesses DATA Generator parameters.

F4 DTMF
Accesses DTMF Generator parameters.

F5 EXT
Accesses External Modulation parameters.

F6 MIC
Accesses MIC Modulation parameters.

47. Modulation Type

Displays selected Modulation Type. Selections include OFF, AM, FM and PM.

Soft Function Keys available with this function include:

F1 OFF
Turns Modulation Source (47) OFF.

F2 AM
Selects AM as Modulation Type for Modulation Source (47).

F3 FM
Selects FM as Modulation Type for Modulation Source (47).

F4 PM
Selects PM as Modulation Type for Modulation Source (47).

47a. Deviation Range

Displays selected Deviation Range for Microphone Modulation. Selections include NAR 3, NAR 2, NAR 1 and WIDE.

Soft Function Keys available with this function include:

F1 NAR 3
Selects Deviation Range (47a) to NAR 3, <2 kHz.

F2 NAR 2
Selects Deviation Range (47a) to NAR 2, 2-12.75 kHz.

F3 NAR 1
Selects Deviation Range (47a) to NAR 1, 12.75-25 kHz.

F4 WIDE
Selects Deviation Range (47a) to WIDE, >25 kHz.

47b. Deviation/Modulation Level

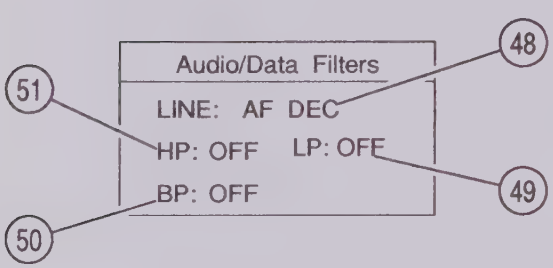
Displays External Deviation in kHz if current Modulation Type (47) is FM with range from 0.00 to 100 kHz. Displays Percent Modulation if current Modulation Type (47) is AM with range from 0.0% to 100%. Displays Deviation in radians if current Modulation Type (47) is PM with range from 0.00 to 10 Radians.

Field is not displayed if Modulation Type (47) is OFF.

Displayed Deviation/Modulation Level is valid only with sine wave input.

C. AUDIO/DATA FILTERS BLOCK

During RF Generator Operation the COM-120B allows configuration for filtering audio signals passed to the unit through the Audio/Data In Connector to the AF Decode Line and Data Decode Line (for digital data). The Speaker/Headphones output is configurable. Configuration is set from the RF Generator Filters Setup Menu. Filters are not editable from the RF Generator Screen. The following information is displayed on the RF Generate Operation Screen:



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48. Filter Line

Displays selected filter line. Readings for High-Pass Filter (51), Low-Pass Filter (49) and Bandpass Filter (50) reflect settings for displayed Filter Line. Filter Lines available with RF Generate Operation Screen are AF Decode Line (AF DEC) and Speaker/Headphones Line (SPKR).

Soft Function Keys available with this function include:

F1 AF DEC
Selects AF Decode Line as current Filter Line.

F2 SPKR
Selects Speaker/Headphones Line as current Filter Line.

F6 CONFIG
Accesses RF Generator Filters Setup Menu.

49. Low-Pass Filter (LPF)

Displays current Low-Pass Filter setting for selected filter line if active. Settings displayed include OFF, 300 Hz, 4 kHz and 20 kHz.

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

50. Bandpass Filter (BPF)

Displays current Bandpass Filter setting for selected filter line if active. Settings displayed include OFF and C-MSG.

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

51. High-Pass Filter (HPF)

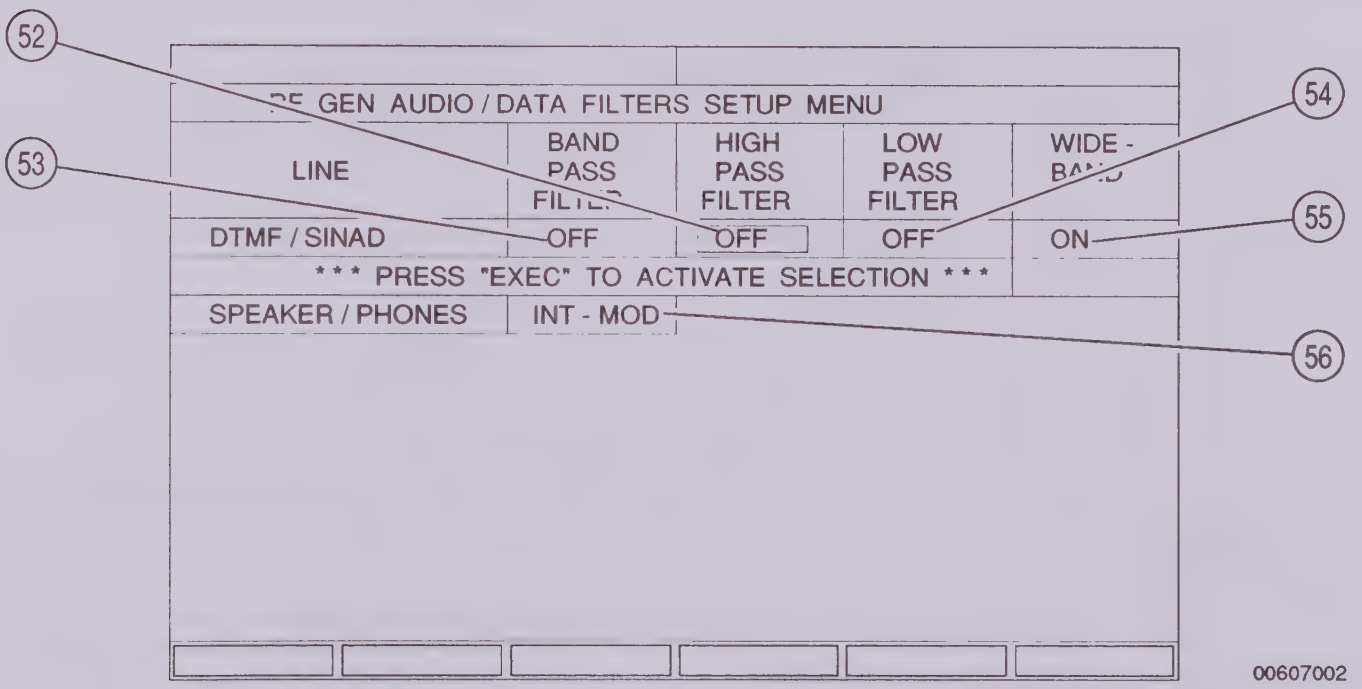
Displays current High-Pass Filter setting for selected filter line if active. Settings displayed include OFF, 300 Hz and 4 kHz.

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Pressing CONFIG Soft Function Key F6 when the cursor is at Filter Line (48) accesses the RF Generator Filters Setup Menu. The RF Generator Filters Setup Menu is in a matrix format. Each row is a separate audio line. Each column is a separate filter line. The audio lines are the DTMF/SINAD Line and the DATA DECODER Line. The Speaker/Headphones is on a separate row for editing filtering parameters. Specific filter columns are Bandpass Filter, High-Pass Filter, Low-Pass Filter and Wide Band Filter. Filter parameters for all RF Generator Audio/Data Lines are editable as shown:

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

EXEC Soft Function Key F5 must be pressed after edits are made for edits to be valid when returning to any other operation mode.



52. DTMF/SINAD Low-Pass Filter Field

Displays current setting for DTMF/SINAD Low-Pass Filter. Settings available include OFF, 300 Hz and 4 kHz. Setting this field to anything other than OFF automatically sets DTMF/SINAD Bandpass Filter Field (52) to OFF.

Soft Function Keys available with this function include:

F1 OFF
Deactivates Low-pass Filtering on DTMF/SINAD Line.

F3 4 kHz
Routes DTMF/SINAD Signal through 4 kHz Low-Pass Filter.

F4 20 kHz
Routes DTMF/SINAD Signal through 4 kHz Low-Pass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to any other operation mode.

F6 RETURN
Returns to RF Generate Operation Screen.

53. DTMF/SINAD Wideband Filter Field

Displays ON if all other filtering is off for DTMF/SINAD signal. Displays OFF if any filter is used for DTMF/SINAD signal. This field is for display only.

54. Speaker/Headphones Filter Field

Displays current setting for Speaker/Headphones Filter. Settings available include OFF, C-MSG (C-Message Weighted Filter), W.B. (Wideband) and INT-MOD (Internal Modulation). The first three selections relate to the audio being sent to the AUDIO/DATA IN Connector. The last selection is the composite modulation signal being generated by the COM-120B.

Soft Function Keys available with this function include:

F1 OFF
Sets Speaker/Headphones operation to OFF.

F2 C-MSG
Routes Audio signal from AUDIO/DATA IN Connector through C-Message Weighted Bandpass Filter to Speaker and Heaphone Connector.

F3 W.B.
Routes Audio signal from AUDIO/DATA IN Connector to Speaker and PHONES Connector without filtering.

F4 INT-MOD
Routes Audio signal from internal Modulation sources as composite signal to Speaker and PHONES Connector.

55. DTMF/SINAD High-Pass Filter Field

Displays current setting for DTMF/SINAD High-Pass Filter. Settings available include OFF, 300 Hz and 4 kHz. Setting this field to anything other than OFF automatically sets DTMF/SINAD Bandpass Filter Field (52) to OFF.

Soft Function Keys available with this function include:

F1 OFF
Deactivates High-Pass Filtering on DTMF/SINAD Line.

F2 300 Hz
Routes DTMF/SINAD Signal through 300 Hz High-Pass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to any other operation mode.

F6 RETURN
Returns to RF Generate Operation Screen.

56. DTMF/SINAD Bandpass Filter Field

Displays current setting for DTMF/SINAD Bandpass Filter. Settings available include OFF and C-MSG. Setting this field to anything other than OFF automatically sets DTMF/SINAD High-Pass Filter Field (53) and

DTMF/SINAD Low-Pass Filter Field (54) to OFF.

Soft Function Keys available with this function include:

F1 OFF
Deactivates Bandpass Filtering on DTMF/SINAD Line.

F2 C-MSG
Routes DTMF/SINAD Signal through C-Message Weighted Bandpass Filter.

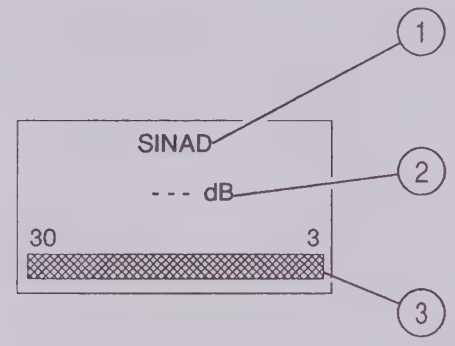
F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to any other operation mode.

F6 RETURN
Returns to RF Generate Operation Screen.

D. SINAD METER

The SINAD Meter for the RF Generate measures SINAD for a 1 kHz tone passed through the AUDIO/DATA IN Connector. Filtering for the signal passed to the SINAD Meter is provided by the Audio/Data Filters.

Information provided from the RF Generate Operation Screen is displayed as follows:



8717040

1. SINAD/Distortion Meter Label

   Displays label for selected Meter Operation. Selections include SINAD and Distortion Meters. Refer to para 3-3-1(E) for description of Distortion Meter.

Soft Function Keys available with this function include:

F1 ZOOM
Expands current meter into full-size meter.

F2 SINAD
Selects SINAD Meter as active meter. Not displayed if meter is currently active.

F3 DIST
Selects Distortion Meter as active meter. Not displayed if meter is currently active.

2. Meter Reading

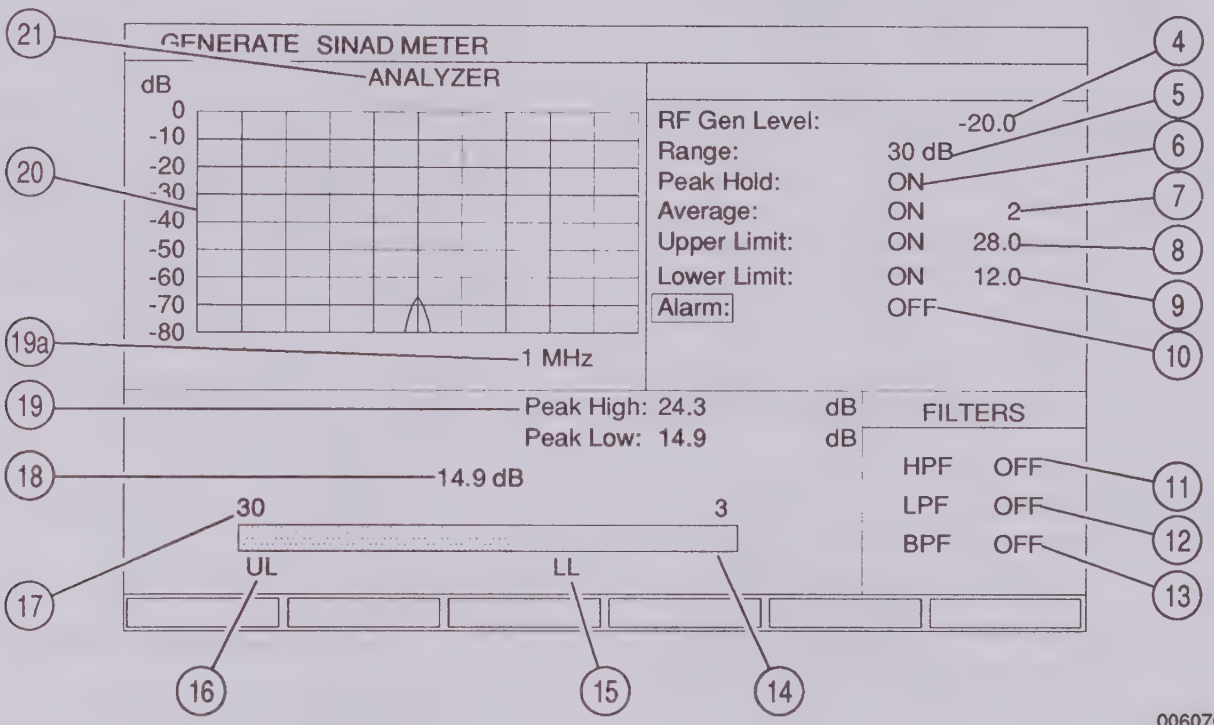
   Displays current SINAD Meter Reading in dB.

3. Meter Bar

   Provides graphic display of current SINAD Meter reading in dB.

Pressing ZOOM Soft Function Key F1 when cursor is at SINAD/Distortion Meter Label (1) accesses full screen SINAD Meter.

Available features and editable fields are listed as follows:



00607003

4. RF Gen Level

Displays Output Level in selected units. If T/R Connector is selected for Output (7), range is -130 to -20 dBm, .07 to 22360.6 µV, 0.0000 to 22.3606 mV and 0.000000 to 0.022360 V. If AUX RF Connector is selected for Output (7), range is -130 to -13 dBm, .07 to 50059.3 µV, 0.0000 to 50.0593 mV and 0.000000 to 0.050059 V.

Soft Function Keys available with this function include:

F1 dBm
Sets Output Level Units to dBm.

F2 uV
Sets Output Level Units to µV.

F3 mV
Sets Output Level Units to mV.

F4 V
Sets Output Level Units to V.

F5 SINAD=
Access field to set SINAD Search Function value.

F5 S=On/Off
Toggles SINAD Search Function On and Off. SINAD Seach Function changes Output Level to search for SINAD= value from UUT. S= Prompt is displayed with function ON.

5. Range

Displays selected SINAD Meter Upper Range. Selections include Autorange, 15 dB and 30 dB.

Soft Function Keys available with this function include:

F1 15 dB
Selects 15 dB as active upper range for SINAD Meter.

F2 30 dB
Selects 30 dB as active upper range for SINAD Meter.

F3 AUTO
Selects Autorange as active upper range for SINAD Meter. This setting automatically adjusts to a higher or lower upper range if signal increases or decreases to a specified level of the current setting.

F5 RST PK
Resets Peak Readings displayed to 0.

F6 RETURN
Returns Test Set to RF Generate Operation Screen.

6. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. When ON, Peak Readings (19) are displayed. Invalid in Autorange.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to RF Generator Operation Screen.

7. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages selected number of readings and reports average as Digital Readout. Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to RF Generator Operation Screen.

8. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0 to 30 dB. When ON, Upper Limit Bar (16) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to RF Generator Operation Screen.

9. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range is 0 to 30 dB. When ON, Lower Limit Bar (15) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to RF Generator Operation Screen.

10. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (8) or is below Lower Limit (9).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to RF Generator Operation Screen.

11. High-Pass Filter (HPF)

Displays current High-Pass Filter setting for SINAD Meter.

12. Low-Pass Filter (LPF)

Displays current Low-Pass Filter setting for SINAD Meter.

13. Bandpass Filter (BPF)

Displays current Bandpass Filter Setting for SINAD Meter.

14. Bar Meter

Relative Graphic display of current SINAD Meter reading.

15. Lower Limit Bar

Indicates position of Lower Limit (9) on Bar Meter (14). If Lower Limit (9) exceeds Range (5), marker is not visible.

16. Upper Limit Bar

Indicates position of Upper Limit (8) on Bar Meter (14). If Upper Limit (8) exceeds Range (5), marker is not visible.

17. Upper Range Limit Readout

Displays current value of Range (4). Redefined as needed if Autorange function is active.

18. Digital Readout

Displays current SINAD Meter Reading.

19. Peak Readings

Displays current high and low Peak Readings when Peak Hold (6) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

19a. Scan Width

Displays current Scan Width. This field is editable. Available Scan Widths include:

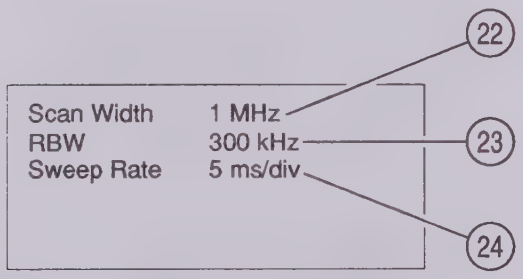
0 kHz	1 kHz	2 kHz
5 kHz	10 kHz	20 kHz
50 kHz	100 kHz	200 kHz
500 kHz	1 MHz	

Soft Function Keys available with this function include:

F1 MENU
Selects a Scan Width pop up menu.

F6 RETURN
Returns to Generate SINAD Meter screen.

F2 CONFIG
Accesses a pop up screen to configure Scan width, RBW (Resolution Bandwidth) and Sweep rate.



00607032

20. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

21. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions.

22. Scan Width

Displays current Analyzer Scan Width. This field is editable. Available Scan Widths include:

0 kHz	1 kHz	2 kHz
5 kHz	10 kHz	20 kHz
50 kHz	100 kHz	200 kHz
500 kHz	1 MHz	

Soft Function Keys available with this function include:

F1 COUPLE
Sets the Sweep and RBW to factory default state for the current scan width.

F6 RETURN
Returns to Generate SINAD Meter screen.

23. RBW (Resolution Bandwidth

Displays current Analyzer Resolution Bandwidth. This field is editable. Available Resolution Bandwidths include:

300 Hz	3 kHz	30 kHz
300 kHz	3 MHz	

Soft Function Keys available with this function include:

F1 COUPLE
Sets the Sweep and RBW to factory default state for the current scan width.

F2 DEFAULT
Sets only the current field to factory default state for the current scan width.

F6 RETURN
Returns to Generate SINAD Meter screen.

24. Sweep Rate

Displays current Analyzer Sweep Rate. This field is editable. Available Sweep Rates include:

200 µs/div	500 µs/div	1 ms/div
2 ms/div	5 ms/div	10 ms/div
20 ms/div	50 ms/div	100 ms/div
200 ms/div	500 ms/div	

Soft Function Keys available with this function include:

F1 COUPLE
Sets the Sweep and RBW to factory default state for the current scan width.

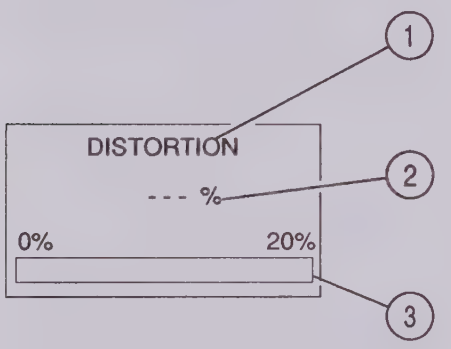
F2 DEFAULT
Sets only the current field to factory default state for the current scan width.

F6 RETURN
Returns to Generate SINAD Meter screen.

E. DISTORTION METER

The Distortion Meter for the RF Generate measures Distortion for a 1 kHz tone passed through the AUDIO/DATA IN Connector. Filtering for the signal passed to the Distortion Meter is provided by the Audio/Data Filters.

Information provided from the RF Generate Operation Screen is displayed as follows:



8717044

1. SINAD/Distortion Meter Label

   Displays label for selected Meter Operation. Selections include SINAD and Distortion Meters.

Soft Function Keys available with this function include:

F1 ZOOM
Expands current meter into full-size meter.

F2 SINAD
Selects SINAD Meter as active meter. Not displayed if meter is currently active.

F3 DIST
Selects Distortion Meter as active meter. Not displayed if meter is currently active.

2. Meter Reading

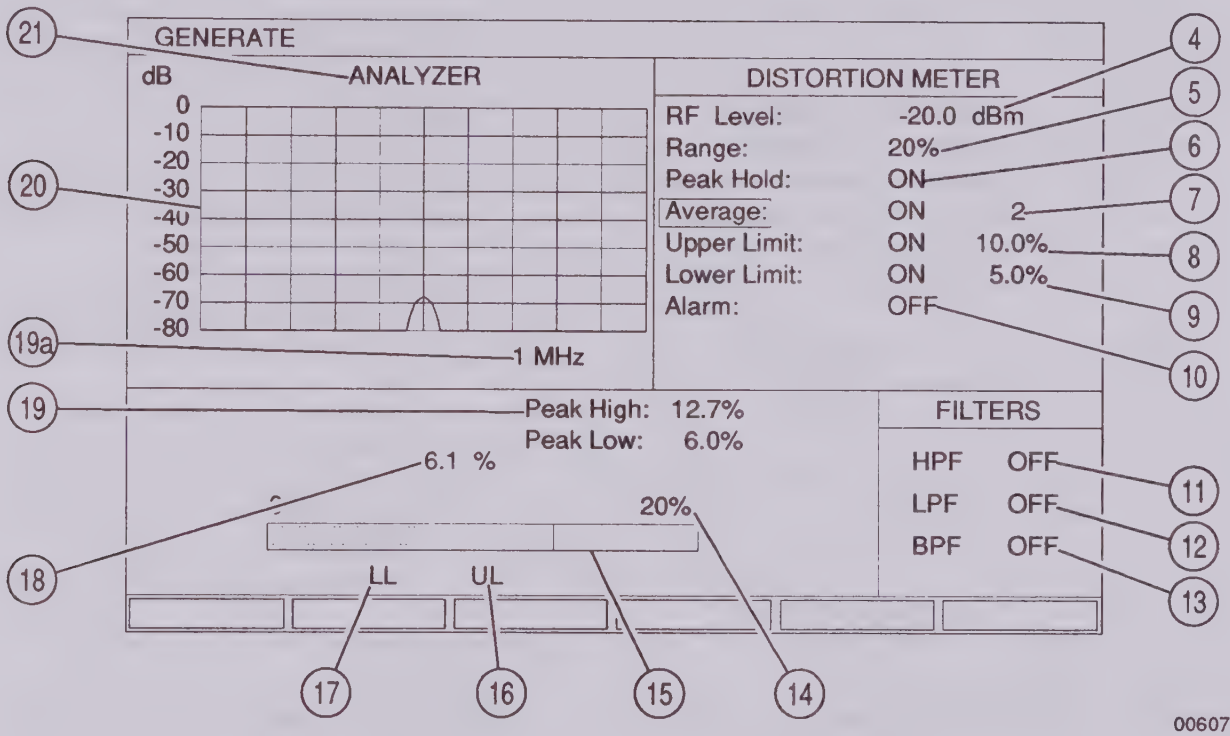
   Displays current Distortion Meter Reading in % Distortion.

3. Meter Bar

   Provides graphical display of current Distortion Meter reading in % Distortion.

Pressing ZOOM Soft Function Key F1 when cursor is at SINAD/Distortion Meter Label (1) accesses full screen Distortion Meter.

Available features editable fields are listed below:



00607033

4. RF Gen Level

Displays selected RF Level of RF Generator.

Soft Function Keys available with this function include:

F1 dBm
Sets Output Level Units to dBm.

F2 uV
Sets Output Level Units to µV.

F3 mV
Sets Output Level Units to mV.

F4 V
Sets Output Level Units to V.

5. Range

Displays Distortion Meter Upper Range of 20%. No other selections are available.

6. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. When ON, Peak Readings (19) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to RF Generator Operation Screen.

7. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Funciton averages selected number of readings and reports the average as Digital Readout (18). Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to RF Generator Operation Screen.

8. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0% to 20%. When ON, Upper Limit Bar (16) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to RF Generator Operation Screen.

9. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range of value is 0% to 20%. When ON, Lower Limit Bar (17) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to RF Generator Operation Screen.

10. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (8) or is below Lower Limit (9).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to RF Generator Operation Screen.

11. High-Pass Filter (HPF)

Displays current High-Pass Filter setting for Distortion Meter.

12. Low-Pass Filter (LPF)

Displays current Low-Pass Filter setting for Distortion Meter.

13. Bandpass Filter (BPF)

Displays current Bandpass Filter setting for Distortion Meter.

14. Upper Range Limit Readout

Displays current value of Range (5). Redefined as needed if Autorange function is active.

15. Bar Meter

Relative Graphic display of current Distortion Meter reading.

16. Upper Limit Bar

Indicates position of Upper Limit (8) on Bar Meter (14). If Upper Limit (8) exceeds Range (5), marker is not visible.

17. Lower Limit Bar

Indicates position of LOWER LIMIT (9) on Bar Meter (14). If Lower Limit (9) exceeds Range (5), marker is not visible.

18. Digital Readout

Displays current Distortion Meter Reading.

19. Peak Readings

Displays current high and low Peak readings when Peak Hold (6) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

19a. Scan Width

Displays current Scan Width. This field is editable. Available Scan Widths include:

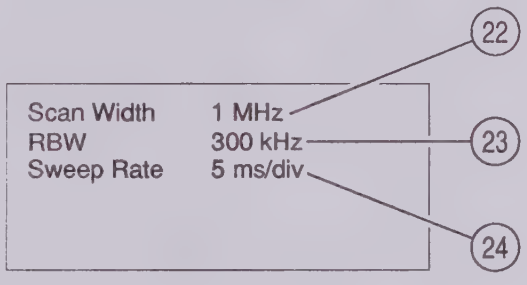
0 kHz	1 kHz	2 kHz
5 kHz	10 kHz	20 kHz
50 kHz	100 kHz	200 kHz
500 kHz	1 MHz	

Soft Function Keys available with this function include:

F1 MENU
Selects a Scan Width pop up menu.

F6 RETURN
Returns to Generate SINAD Meter screen.

F2 CONFIG
Accesses a pop up screen to configure Scan width, RBW (Resolution Bandwidth) and Sweep rate.



00607032

20. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

21. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions.

22. Scan Width

Displays current Analyzer Scan Width. This field is editable. Available Scan Widths include:

0 kHz	1 kHz	2 kHz
5 kHz	10 kHz	20 kHz
50 kHz	100 kHz	200 kHz
500 kHz	1 MHz	

Soft Function Keys available with this function include:

F1 COUPLE
Sets the Sweep and RBW to factory default state for the current scan width.

F6 RETURN
Returns to Generate Distortion Meter screen.

23. RBW (Resolution Bandwidth

Displays current Analyzer Resolution Bandwidth. This field is editable. Available Resolution Bandwidths include:

300 Hz	3 kHz	30 kHz
300 kHz	3 MHz	

Soft Function Keys available with this function include:

F1 COUPLE
Sets the Sweep and RBW to factory default state for the current scan width.

F2 DEFAULT
Sets only the current field to factory default state for the current scan width.

F6 RETURN
Returns to Generate Distortion Meter screen.

24. Sweep Rate

Displays current Analyzer Sweep Rate. This field is editable. Available Sweep Rates include:

200 µs/div	500 µs/div	1 ms/div
2 ms/div	5 ms/div	10 ms/div
20 ms/div	50 ms/div	100 ms/div
200 ms/div	500 ms/div	

Soft Function Keys available with this function include:

F1 COUPLE
Sets the Sweep and RBW to factory default state for the current scan width.

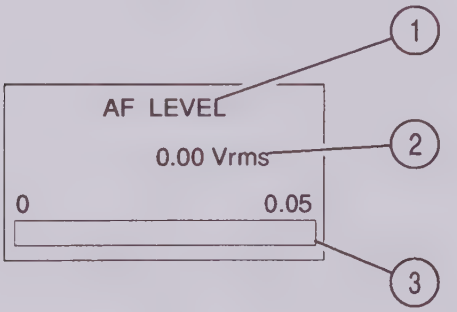
F2 DEFAULT
Sets only the current field to factory default state for the current scan width.

F6 RETURN
Returns to Generate Distortion Meter screen.

F. AUDIO FREQUENCY LEVEL (AF LVL) METER

The Audio Frequency Level Meter for the RF Generate measures the level of an audio signal passed to the COM-120B through the AUDIO/DATA IN Connector. Measurement selections are in Vrms, dBm (referenced to Impedence [16]) or dB.

Information provided from the RF Generate Operation Screen is displayed as follows:



8717042

1. AF LVL Meter Label

   Label for Audio Frequency Level Meter Operation.

   Soft Function Keys available with this function include:

   F1 ZOOM
   Expands current meter into full-size meter.

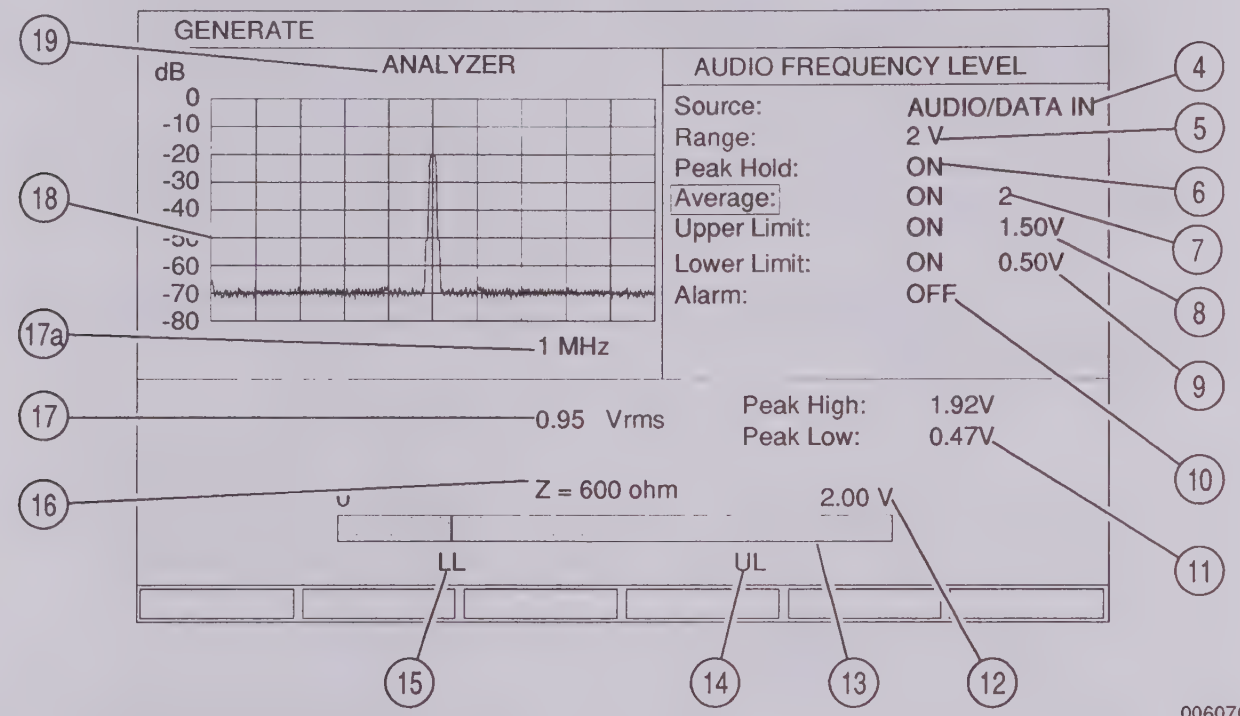
2. Meter Reading

   Displays current AF LVL Meter reading in Vrms, dBm (referenced to Impedance [16]) or dB as selected under Digital Readout (11).

3. Meter Bar

   Provides graphical display of current AF LVL Meter reading in Vrms.

Pressing ZOOM Soft Function Key F1 when cursor is at AF LVL Meter Label (1) accesses full screen Audio Frequency Level Meter. Available features and editable fields are as follows:



00607035

4. Source

Displays AUDIO/DATA IN Connector as source for Audio Frequency Level Meter. This field is for display only.

5. Range

Displays selected meter Range. Selections include AUTO (Autorange) and the following:

50 mV	100 mV	200 mV
500 mV	1 V	2 V
5 V	10 V	20 V
50 V		

Soft Function Keys available with this function include:

F1 MENU
Activates Menu for selecting Meter Range. Soft Function Keys available with this function include:

F6 RETURN
Returns Test Set to AF LVL Meter Operation Screen.

F6 RETURN
Returns Test Set to RF Generate Operation Screen.

6. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. When ON, Peak Readings (11) are displayed. Invalid in Autorange.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to RF Generate Operation Screen.

7. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages selected number of readings and reports average as Digital Readout (17). Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to RF Generate Operation Screen.

8. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0 to 50 Vrms. When ON, Upper Limit Bar (14) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to RF Generator Operation Screen.

9. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range is 0 to 50 Vrms. When ON, Lower Limit Bar (15) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Generator Operation.

10. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (8) or is below Lower Limit (9).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to RF Generator Operation Screen.

11. Digital Readout

Displays current AF LVL Meter Reading in selected units. Units available include Vrms, dBm (referenced to Impedance [16]) and dB.

Soft Function Keys available with this function include:

F1 Vrms
Selects Vrms as active units for measure.

F2 dBm
Selects dBm (referenced to Impedance [16]) as active units for measure.

F3 dB
Selects dB as active units for measure.

F6 RETURN
Returns Test Set to RF Generator Operation Screen.

12. Upper Range Limit Readout

Displays current value of RANGE (5). Redefined as needed if Autorange function is active.

13. Bar Meter

Relative Graphic display of current AF LVL Meter reading.

14. Lower Limit Bar

Indicates position of Lower Limit (9) on Bar Meter (14). If Lower Limit (9) exceeds RANGE (5), marker is not visible.

15. Upper Limit Bar

Indicates position of Upper Limit (8) on Bar Meter (14). If Upper Limit (8) exceeds RANGE (5), marker is not visible.

16. Impedance

Reference Impedance for Digital Readout (11) in dBm. Value range: 0 to 1000 Ohms.

17. Peak Readings

Displays current high and low Peak readings when PEAK HOLD (6) is set to ON. Readings are reinitialized when RST PK Soft Function Key is pressed.

17a. Scan Width

Displays current Scan Width. This field is editable. Available Scan Widths include:

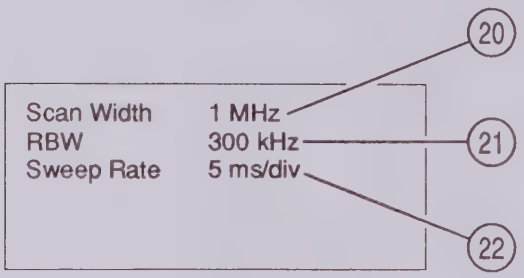
0 kHz	1 kHz	2 kHz
5 kHz	10 kHz	20 kHz
50 kHz	100 kHz	200 kHz
500 kHz	1 MHz	

Soft Function Keys available with this function include:

F1 MENU
Selects a Scan Width pop up menu.

F6 RETURN
Returns to Generate AF Level Meter screen.

F2 CONFIG
Accesses a pop up screen to configure Scan width, RBW (Resolution Bandwidth) and Sweep rate.



00607036

18. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

19. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions.

20. Scan Width

Displays current Analyzer Scan Width. This field is editable. Available Scan Widths include:

0 kHz	1 kHz	2 kHz
5 kHz	10 kHz	20 kHz
50 kHz	100 kHz	200 kHz
500 kHz	1 MHz	

Soft Function Keys available with this function include:

F1 COUPLE
Sets the Sweep and RBW to factory default state for the current scan width.

F6 RETURN
Returns to Generate AF Level Meter screen.

21. RBW (Resolution Bandwidth

Displays current Analyzer Resolution Bandwidth. This field is editable. Available Resolution Bandwidths include:

300 Hz	3 kHz	30 kHz
300 kHz	3 MHz	

Soft Function Keys available with this function include:

F1 COUPLE
Sets the Sweep and RBW to factory default state for the current scan width.

F2 DEFAULT
Sets only the current field to factory default state for the current scan width.

F6 RETURN
Returns to Generate AF Level Meter screen.

22. Sweep Rate

Displays current Analyzer Sweep Rate. This field is editable. Available Sweep Rates include:

200 µs/div	500 µs/div	1 ms/div
2 ms/div	5 ms/div	10 ms/div
20 ms/div	50 ms/div	100 ms/div
200 ms/div	500 ms/div	

Soft Function Keys available with this function include:

F1 COUPLE
Sets the Sweep and RBW to factory default state for the current scan width.

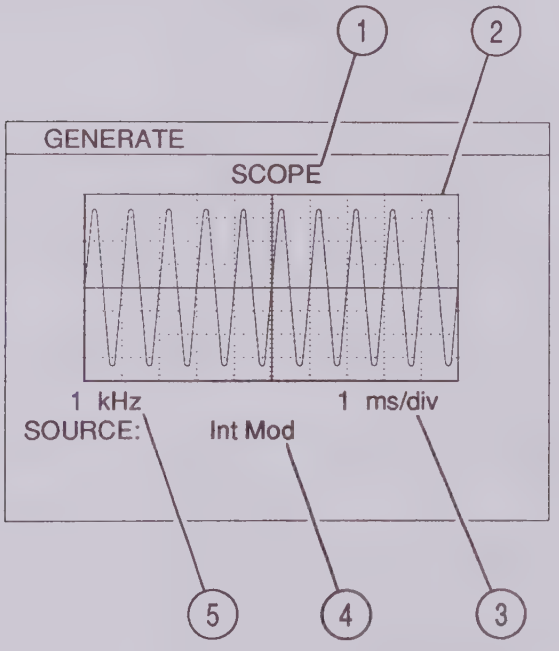
F2 DEFAULT
Sets only the current field to factory default state for the current scan width.

F6 RETURN
Returns to Generate AF Level Meter screen.

G. OSCILLOSCOPE OPERATION SCREEN

The abbreviated Oscilloscope, as follows below, is visible from the RF Generate Operation Screen and the following operation screens:

SINAD Meter Operation Screen
Distortion Meter Operation Screen
Audio Frequency Level Meter Operation Screen.



00607004

1. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions.

Soft Function Keys are available on RF Generate Operation Screen only:

F1 ZOOM
Accesses expanded version of active function.

F2 ANALY/SCOPE
Accesses inactive function. If SCOPE is active, displays ANALY. If ANALYZER is active, displays SCOPE.

2. Oscilloscope Screen

Displays digitized trace of specified signal.

3. Sweep

Displays selected Oscilloscope Sweep Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Scale. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into Generate Operation Screen.

F2 ROLL
Views the scope trace in a roll mode when the selected sweep rate is 100 ms/Div or higher.

F2 SLOW
Returns to the normal mode of operation.

4. SCOPE SOURCE

Displays selected Oscilloscope Source. Selections include:

Source	Signal Input	Signal Type
Scope/DVM-GND	SCOPE/DVM Connector	External GND-Coupled Signal
Scope/DVM-AC	SCOPE/DVM Connector	External AC-Coupled Signal
Scope/DVM-DC	SCOPE/DVM Connector	External DC-Coupled Signal
Ext Mod	EXT MOD IN Connector	External Modulation
Notch Residual	Internal Filtered Signal	Notch Filtered Signal passed to SINAD and Distortion Meters. Reading is relative with no units applied.
Audio/Data In	AUDIO/DATA IN Connector	External Audio or Data Signal
Int Mod	Internal Modulation	Composite Modulation Signal generated by Internal Audio/Data Generators

Soft Function Keys available with this function include:

F1 MENU
Accesses MENU to set active Oscilloscope Source. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into Generate Operation Screen without changing Source.

5. Oscilloscope Scale

Displays selected Oscilloscope Vertical Scale. Selections available differ with different SCOPE SOURCE (4). Scales for each SCOPE SOURCE (4) are as follows:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
Ext Mod	100, 200, 500 mV/Div 1, 2, 5 V/Div
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data In	100, 200, 500 mV/Div 1, 2, 5 V/Div
Int Mod	
GEN1 FM >25 kHz:	1, 2, 5, 10, 20, 50 kHz/Div
GEN1 FM 2.5 to 12.75 kHz:	1, 2, 5, 10, 20, 50 kHz/Div

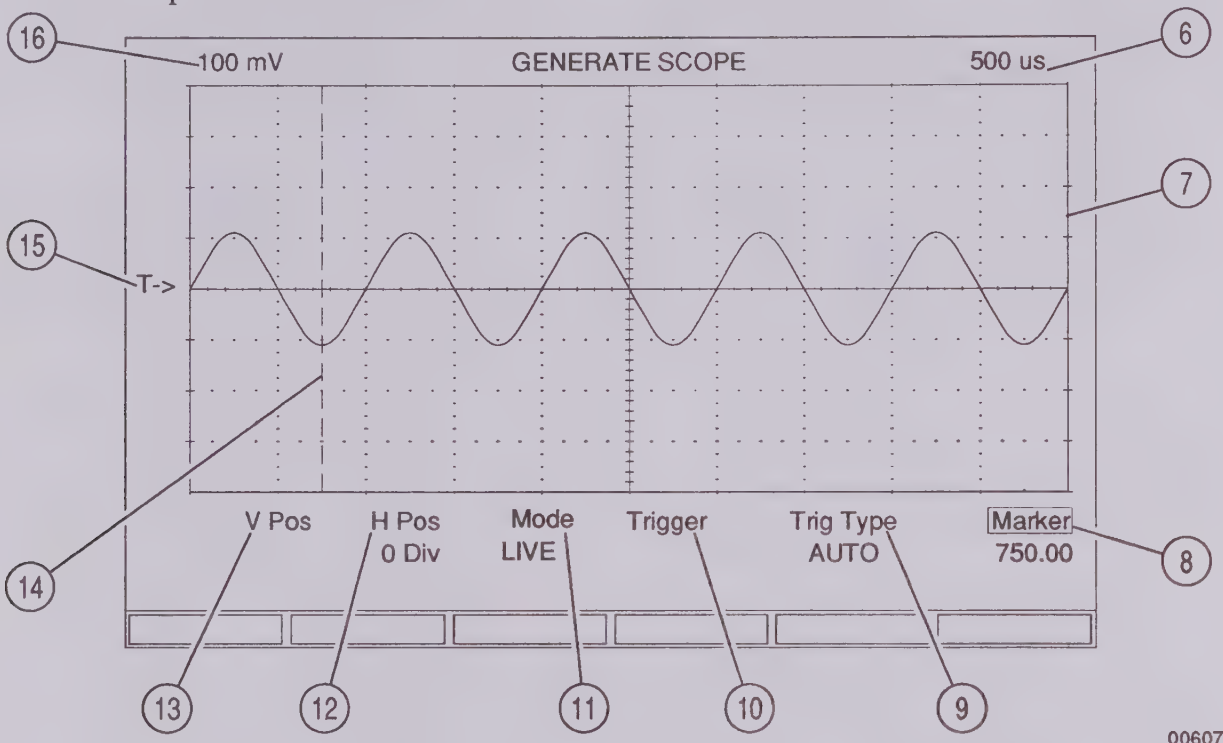
SCOPE SOURCE (4)	Available Scales
GEN1 FM 12.75 to 25 kHz:	.2, .4, 1, 2, 4, 10 kHz/Div
GEN1 FM <2.5 kHz:	.2, .4, 1, 2, 4, 10 kHz/Div
GEN1 PM <2.55 RAD:	.2, .4, 1, 4, 10 kHz/Div
GEN1	1, 2, 5, 10, 20,50 RAD/Div
GEN1 AM:	all settings 20%

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Scale. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into Generate Operation Screen.

Pressing ZOOM Soft Function Key F1 accesses full screen Oscilloscope, when cursor is on SCOPE/ANALYZER Prompt (1) of RF Generate Operation Screen and abbreviated Oscilloscope are displayed. Available features and parameters are as follows:



6. Sweep

Displays selected Oscilloscope Sweep. Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Scale. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into Generate Scope Screen.

F2 ROLL
Views the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.

F2 SLOW
Returns to the normal mode of operation.

7. Oscilloscope Screen

Displays digitized trace of specified signal.

8. Marker Position

Displays current Marker Position if Marker (14) is active or OFF if inactive. Value for Marker Position is in same units as Sweep (6) with Trigger point as reference.

Soft Function Keys available with this function include:

F1 ON/OFF
Toggles Marker (14) between ON and OFF.

9. Trigger Type

Displays current Trigger Type. Selections include Auto, One Shot and Normalized.

Soft Function Keys available with this function include:

F1 NORM
Selects Normalized Trigger Type.

F2 AUTO
Selects Auto as Trigger Type.

F3 1 SHOT
Selects and enables One Shot as Trigger Type.

10. Trigger

Adjusts trigger level as indicated by Trigger Level Indicator (15) when accessed.

11. Mode

Displays selected Operation Mode. Selections include Live, Compare, Recall, Store, and Average. Live displays current signal without modification. Compare displays Stored trace and live trace simultaneously. Recall displays Stored trace only. Store places copy of current trace in memory. Average displays average of last four traces.

Soft Function Keys available with this function include:

F2 LIVE
Selects LIVE as Oscilloscope Operation Mode.

F3 AVG
Selects Average as Oscilloscope Operation Mode.

F4 COMPARE
Selects COMPARE as Oscilloscope Operation Mode.

F5 RECALL
Selects RECALL as Oscilloscope Operation Mode.

F6 STORE
Selects STORE as Oscilloscope Operation Mode.

12. H Pos

Displays selected horizontal offset in major divisions. Selections range from -10 to +10 Divisions.

13. V Pos

Accesses vertical position of trace.

14. Marker

User editable Marker controlled using Marker Position (8). Movable through extent of visible screen.

15. Trigger Level Indicator

Indicates level of Oscilloscope Trigger Level. Editable using Trigger (10).

16. Oscilloscope Scale

Displays selected Oscilloscope Vertical Scale. Selections available differ with different Source as set in RF Generate Operation Screen. Scales are as follows:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
Ext Mod	100, 200, 500 mV/Div 1, 2, 5 V/Div
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data In	100, 200, 500 mV/Div 1, 2, 5 V/Div
Int Mod	
GEN1 FM >25 kHz:	1, 2, 5, 10, 20, 50 kHz/Div
GEN1 FM 2.5 to 12.75 kHz:	1, 2, 5, 10, 20, 50 kHz/Div
GEN1 FM 12.75 to 25 kHz:	.2, .4, 1, 2, 4, 10 kHz/Div
GEN1 FM <2.5 kHz:	.2, .4, 1, 2, 4, 10 kHz/Div
GEN1 PM <2.55 RAD:	.2, .4, 1, 4, 10 kHz/Div
GEN1 PM >2.55 RAD:	1, 2, 5, 10, 20,50 RAD/Div
GEN1 AM:	all settings 20%

Soft Function Keys available with this function include:

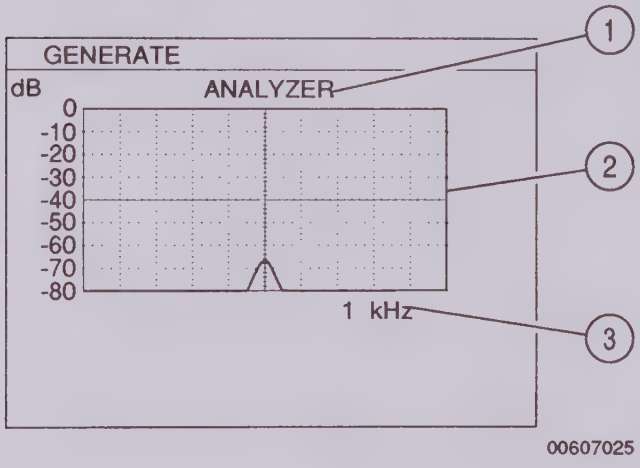
F1 MENU
Accesses Menu to set Oscilloscope Scale. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into Generate Scope Screen.

H. SPECTRUM ANALYZER OPERATION SCREEN

The abbreviated Spectrum Analyzer, as follows, is visible from the RF Generate Operation Screen and the following Operation Screens:

SINAD Meter Operation Screen
Distortion Meter Operation Screen
Audio Frequency Level Meter Operation Screen.



1. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions.

Soft Function Keys available on RF Generate Operation Screen include:

F1 ZOOM
Accesses expanded version of active function.

F2 ANALY/SCOPE
Accesses inactive function. If SCOPE is active, displays ANALY. If ANALYZER is active, displays SCOPE.

2. Spectrum Analyzer Screen

Displays digitized trace of specified signal.

3. Scan Width

Displays selected Scan Width per division. Selections include zero scan and:

1 kHz	2 kHz	5 kHz
10 kHz	20 kHz	50 kHz
100 kHz	200 kHz	500 kHz
1 MHz		

To access additional Scan Widths (2, 5, 10, 20, 50 and 100 MHz), ZOOM the Analyzer Screen.

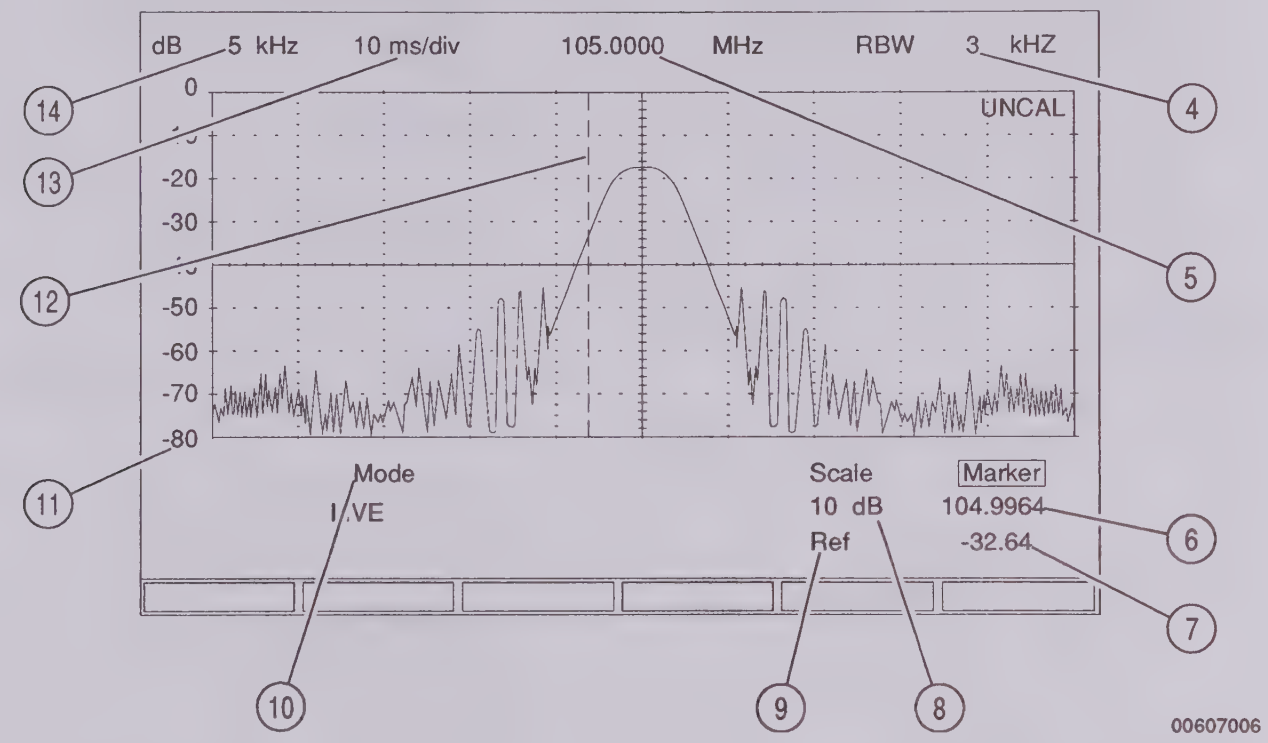
Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Scan Width. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into Generate Analyzer Screen.

F2 CONFIG
Accesses a pop up screen to configure Scan width, RBW (Resolution Bandwidth) and Sweep rate.

Pressing ZOOM Soft Function Key F1 accesses full screen Spectrum Analyzer, when cursor is on SCOPE/ANALYZER Prompt (1) of RF Generate Operation Screen and abbreviated Spectrum Analyzer is displayed. Available features and parameters are as follows:



4. Resolution Bandwidth

Displays Resolution Bandwidth for selected Scan Width (14). This field is editable. The word "UNCAL" appears in the display when combinations of RBW, frequency span and sweep rate for which the analyzer is not calibrated are used. Available RBW selections include:

300 Hz	3 kHz	30 kHz
300 kHz	3 MHz	

Soft Function Keys available with this function include:

F1 MENU
Accesses a Menu with RBW selections.

F6 RETURN
Exits Menu into Generate Analyzer Screen.

F5 DEFLT
Sets only the current field to factory default.

F6 COUPLE
Sets the sweep and RBW to factory default state for the current scan width.

5. Center Frequency

Displays current selected Center Frequency. Selections range from 0.0000 to 1000.0000 MHz. In Wide Scan (≥2 MHz/div), Center Frequency edges do not go below 0.0000 or above 1000.0000 MHz.

F1 Set Ref
Adjusts Spectrum Analyzer to an internal reference level at current frequency. Function must be initiated at each new frequency to achieve maximum accuracy.

6. Marker Position

Displays current Marker Position if Marker (12) is active or OFF if inactive. Value for Marker Position is MHz.

Soft Function Keys available with this function include:

F1 ON/OFF
Toggles Marker (12) between ON and OFF.

7. Marker Level

Displays current Marker Level if Marker (12) is active. Displays Blank if Marker (12) is OFF.

8. Scale

Displays selected Logarithmic Scale for Spectrum Analyzer Vertical Scale (11). Selections are 2 and 10 dB.

F1 10 dB
Selects 10 dB Logarithmic Scale for Spectrum Analyzer Vertical Scale (11).

F2 2 dB
Selects 2 dB Logarithmic Scale for Spectrum Analyzer Vertical Scale (11).

9. Reference

Adjusts Spectrum Analyzer Vertical Scale (11) ±10 dB when Scale (8) is set to 10 dB. When Scale (8) is set to 2 dB, adjusts Spectrum Analyzer Vertical Scale (11) through full range, displaying 16 dB window and incrementing in 1 dB steps.

10. Mode

Displays selected Operation Mode. Selections include Peak Hold, Live, Compare, Recall, Store, Average and Normalized.

Soft Function Keys available with this function include:

F1 PKHOLD
Selects PEAK HOLD as Spectrum Analyzer Operation Mode.

F2 LIVE
Selects LIVE as Spectrum Analyzer Operation Mode.

F3 AVG
Selects AVERAGE as Spectrum Analyzer Operation Mode.

F4 COMPARE
Selects COMPARE as Spectrum Analyzer Operation Mode.

F5 RECALL
Selects RECALL as Spectrum Analyzer Operation Mode.

F6 STORE
Selects STORE as Spectrum Analyzer Operation Mode.

11. Vertical Scale

Provides logarithmic scale for Spectrum Analyzer. Position is controlled by Reference (9).

12. Marker

User editable Marker controlled using Marker Position (6).

13. Zero Scan Sweep

Displays selected Sweep per division. Selections include:

200 µs/div	500 µs/div	1 ms/div
2 ms/div	5 ms/div	10 ms/div
20 ms/div	50 ms/div	100 ms/div
200 ms/div	500 ms/div	

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Scan Width. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into Generate Analyzer Screen.

F5 DEFLT
Sets only the current field to factory default.

F6 COUPLE
Sets the sweep and RBW to factory default state for the current scan width.

14. Scan Width

Displays selected Scan Width per division. Selections include zero scan and:

1 kHz	2 kHz	5 kHz
10 kHz	20 kHz	50 kHz
100 kHz	200 kHz	500 kHz
1 MHz	2 MHz	5 MHz
10 MHz	20 MHz	50 MHz
100 MHz		

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Scan Width. Soft Function Keys available with this function include:

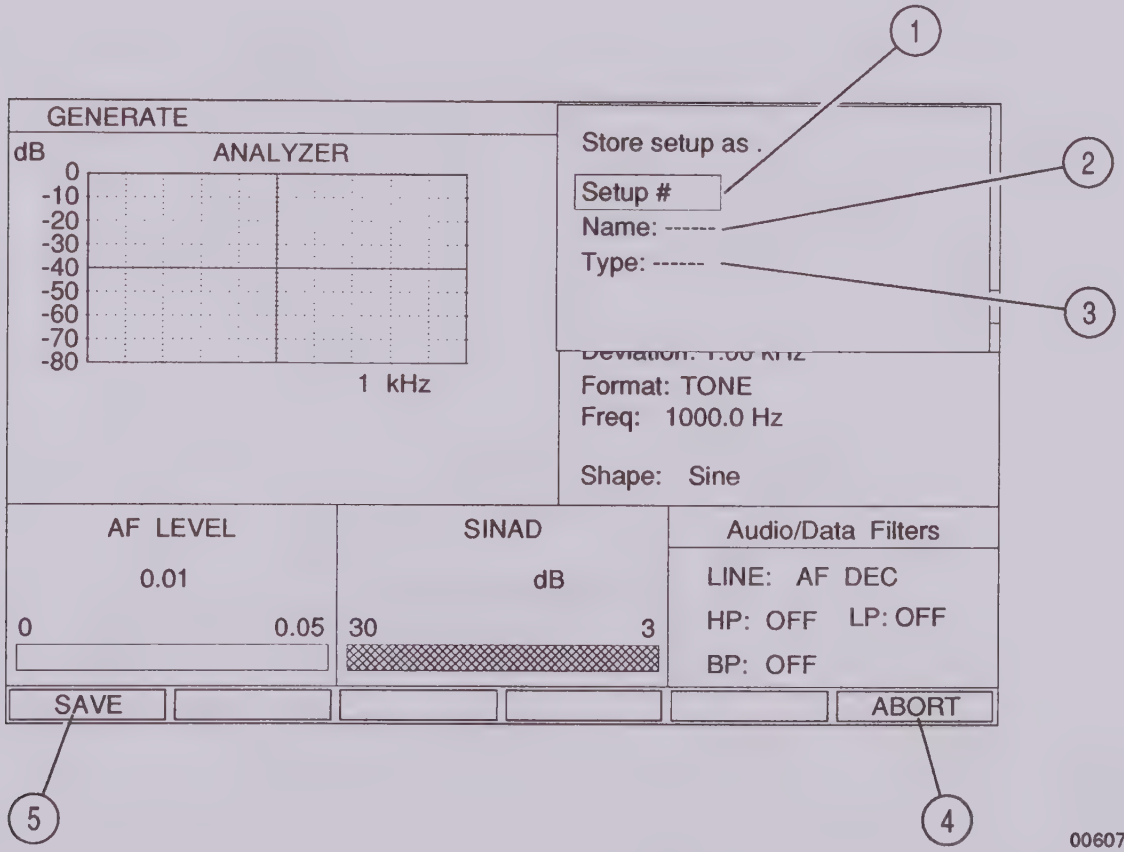
F6 RETURN
Exits Menu into Generate Analyzer Screen.

F6 COUPLE
Sets the sweep and RBW to factory default state for the current scan width.

I. STORE AND RECALL OPERATION

Pressing STORE Memory Key allows the operator to store up to 50 RF Generate Operation Screen configurations. Storage Locations 0 through 49 can be used to store an RF Generate Operation configuration, RF Receive Operation configuration or Duplex Operation configuration (Receive and Generate pair).

Pressing STORE Memory Key when in RF Generate Operation Screen accesses the following fields:



00607007

1. Setup #

Displays selected Memory Location for storage of current configuration.

2. Name

Displays optional alphanumeric label for selected Memory Location.

3. Type

Displays the type of data currently saved in the specified setup number. Available types to save and recall are: DUPLEX, GENERATOR, RECEIVER and EMPTY.

4. ABORT Soft Function Key F6

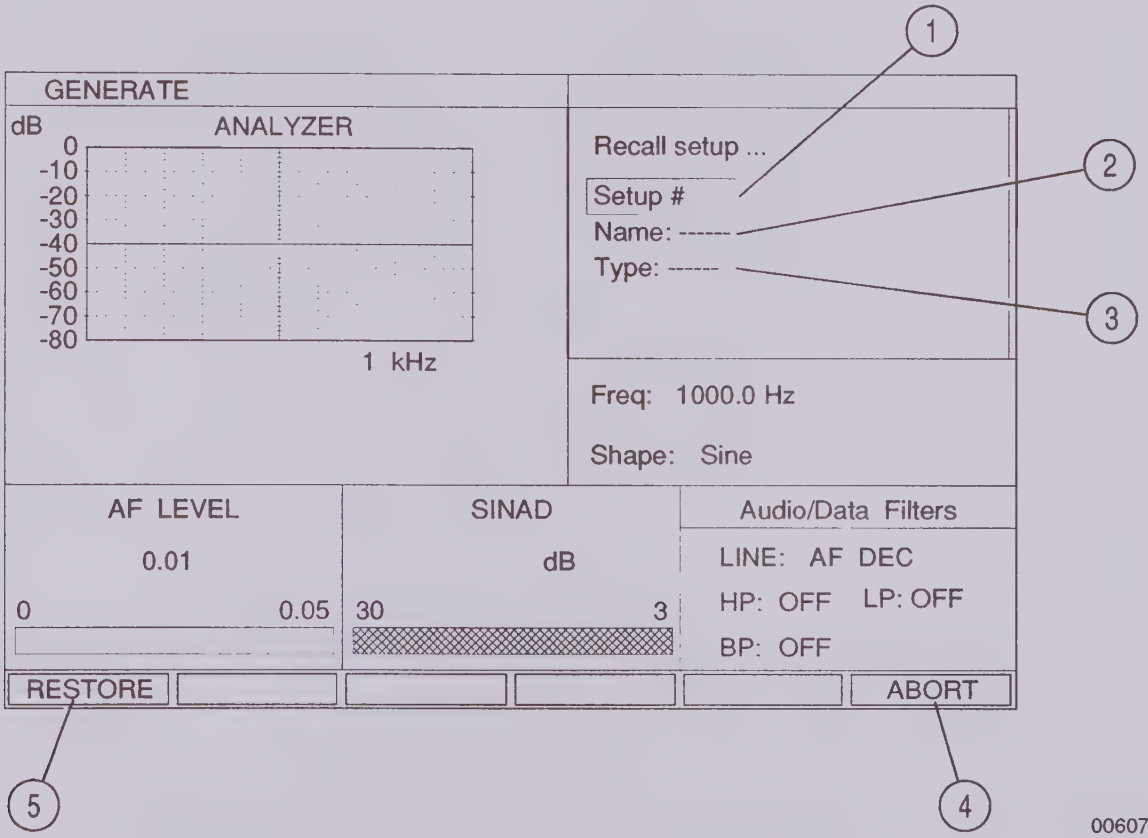
Escapes Storage Operation without performing edit. SAVE Soft Function Key F1 (5) or ABORT Soft Function Key F6 must be pressed to return to normal operation.

5. SAVE Soft Function Key F1

Finalizes Storage Operation. SAVE Soft Function Key F1 or ABORT Soft Function Key F6 (4) must be pressed to return to normal operation.

Pressing RCL Memory Key allows the operator to recall up to 50 previously stored operation screens. RF Receive, RF Generate or Duplex Operation Screen configurations can all be accessed from the RF Generate Operation Screen. Accessing anything other than an RF Generate Operation Screen configuration, automatically switches the COM-120B to the selected mode of operation.

Pressing RCL Memory Key when in RF Generate Operation Screen accesses the following fields:



00607008

1. Setup #

   Displays selected Memory Location for recall of stored configuration.

2. Name

   Displays optional alphanumeric label for selected Memory Location.

3. Type

   Displays the type of data saved in the specified setup number. Available types to save and recall are: DUPLEX, GENERATOR, RECEIVER and EMPTY.

4. ABORT Soft Function Key F6

Escapes Storage Operation without performing edit. RESTORE Soft Function Key F1 (5) or ABORT Soft Function Key F6 must be pressed to return to normal operation.

5. RESTORE Soft Function Key F1

Finalizes Recall Operation. RESTORE Soft Function Key F1 or ABORT Soft Function Key F6 (4) must be pressed to return to normal operation.

3-3-2 RF RECEIVE OPERATION SCREEN

The RF Receive Operation Screen is used to define and activate the COM-120B RF Receiver. The RF Receive Operation Screen is accessed by pressing the REC Test Mode Key. The RF Receive Operation Screen displays in the configuration last used.

Because of the level of detail required to fully describe the RF Receive Operation Screen, information is split by function into sections. The first section covers the overall screen.

A. RF Receive General Operation Screen

B. Audio/Data Filters Block

C. Decoding Screens

D. SINAD Meter

E. Distortion Meter

F. FM Deviation Meter

G. AM Modulation Meter

H. Phase Modulation Meter

I. RF Power Meter

J. Received Level Meter

K. RF Frequency Error Meter

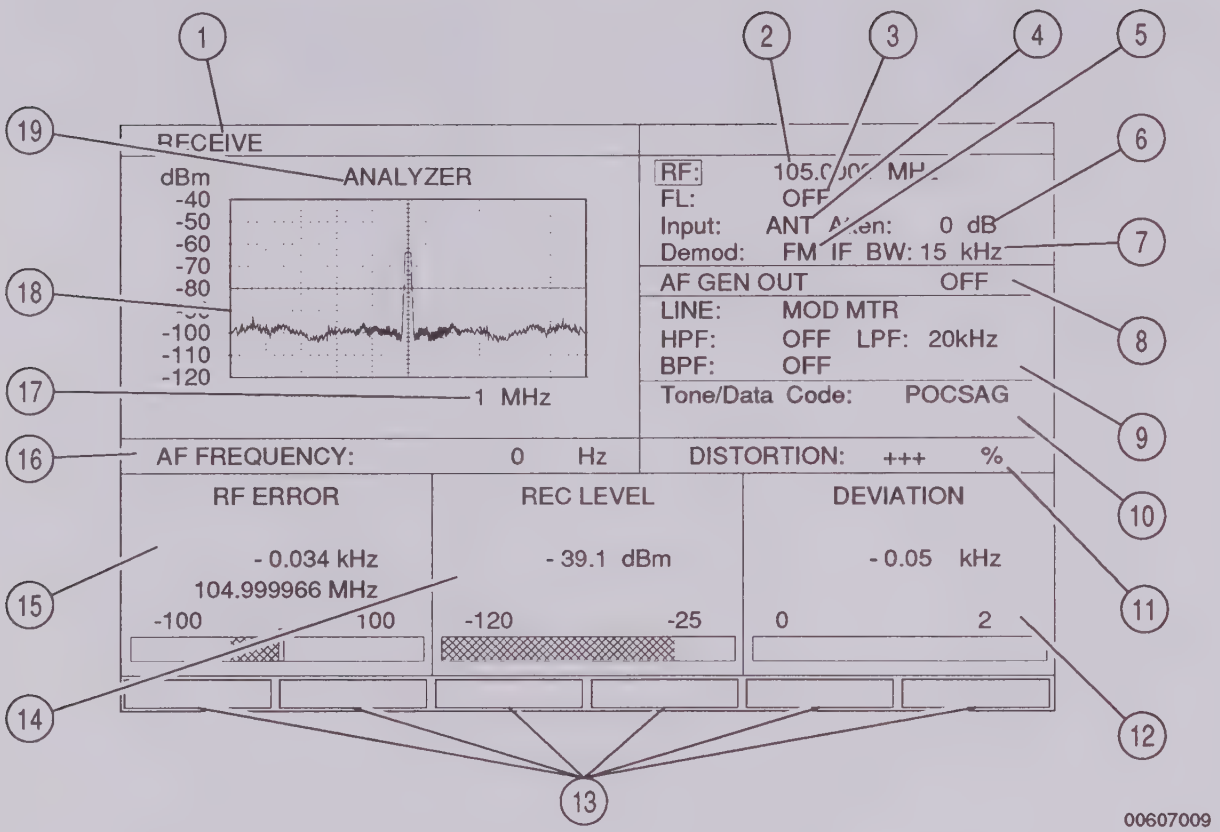
L. Audio Frequency Counter

M. Oscilloscope Operation Screen

N. Spectrum Analyzer Operation Screen

O. Store and Recall Operation

A. RF RECEIVE GENERAL OPERATION SCREEN



RF Receive Operation Screen

1. Header Bar

Displays current operation mode.

2. RF Field

Displays current RF Receive Frequency from 0.0000 to 1000.0000 MHz. Scan Function searches a specified Frequency List (3) range, stopping for a selected time period or when squelch is broken. Sweep Function sweeps a set range of frequencies, increasing or decreasing frequency at set rate and stopping for a set time or when squelch is broken. Δ Function allows change of frequency in selected increment (Δ).

Soft Function Keys available with this function include:

F1 Δ=
Accesses window to set RF Frequency Field change increment (Δ).

F2 Δ ON/OFF
Toggles Δ Function OFF and ON. If Δ Function is active, Δ Prompt is displayed.

F3 SCAN

Accesses Scan Menu for setting parameters of Scan Function. Scan Function scans specified frequencies on Frequency List. Additional variables include Pause Time and Delay Time. With Pause Time set to zero, Scan Function is dependent on squelch. When Squelch is broken, the Receiver stops scanning and remains on frequency until COM-120B is squelched for time period greater than Delay Time. RF Field and FL Field (3) reflect frequency where squelch is broken. With value other than zero in Pause Time field, RF Receiver delays at each frequency for time equal to Pause Time, with Delay Time not used. With Scan Function active, Soft Function Keys are defined as follows:

F1 START
Activates Scan Function in continuous loop.

F2 STOP
Stops active Scan Function.

F3 SINGLE
Activates Scan Function for one sequence.

F5 RESUME
Resumes Scan Function after STOP Soft Function Key F2 is pressed at next Frequency List setting.

F6 RETURN
Returns COM-120B to normal RF Receive Operation.

F4 SWEEP

Accesses menu to configure COM-120B RF Receiver to sweep a specified frequency range. Sweep Function scans specified frequency range. Additional variables include Pause Time and Delay Time. With Pause Time set to zero, Sweep Function is dependent on squelch. When Squelch is broken, Receiver stops sweeping and remains on that frequency until the COM-120B is squelched for a time period greater than the Delay Time. RF Field and FL Field (3) reflect the frequency where squelch is broken. With a value other than zero in Pause Time field, RF Receiver delays at each frequency for time equal to Pause Time, with Delay Time not used. With Sweep Function active, Soft Function Keys are defined as follows:

F1 START
Activates Sweep Function in continuous loop.

F2 STOP
Stops Sweep Function.

F3 SINGLE
Activates Sweep Function for one pass through frequency range.

F5 RESUME
Resumes Scan Function after STOP Soft Function Key F2 was pressed at next frequency.

F6 RETURN
Returns COM-120B to normal RF Receive Operation.

F5 LOCK/UNLOCK
Sets frequency used for Generate Operation, Receive Operation and Spectrum Analyzer Operation to same frequency as current RF Field. If LOCK Function is active, "L" is displayed and UNLOCK is displayed for F5 definition. Pressing F5 when UNLOCK is displayed, toggles LOCK Function off.

3. FL (Frequency List) Setting

Displays selected Frequency List number (FL-00 through FL-99) when active and OFF when inactive. RF Field (2) echoes frequency of selected Frequency List setting. Directly editing RF Field (2) inactivates FL Setting. Displays optional Frequency List Label if used.

Soft Function Keys available with this function include:

F1 On/Off
Toggles active function ON and OFF.

F2 T-Fwd
Accesses Trunking-Forward Channel List.

F3 T-Rvs
Accesses Trunking-Reverse Channel List.

F4 C-Fwd
Accesses Cellular-Forward Channel List.

F5 C-Rvs
Accesses Cellular-Reverse Channel List.

F6 FL
Accesses User Defined Frequency List.

4. Input Connector

Displays connector selected for input. Displays either T/R or ANT.

Soft Function Keys available with this function include:

F1 T/R
Selects T/R Connector as input connector.

F2 ANT
Selects ANTENNA Connector as input connector.

5. Demodulation Type

Displays selected Demodulation Type. Selections include FM, AM or PM.

Soft Function Keys available with this function include:

F1 FM
Selects FM Demodulation.

F2 AM
Selects AM Demodulation.

F3 PM
Selects PM Demodulation.

6. Attenuation

Displays selected attenuation of input signal. Displays either 0 or 30.

Soft Function Keys available with this function include:

F1 30 dB
Selects 30 dB Attenuation.

F2 0 dB
Selects 0 dB Attenuation.

7. IF Bandwidth

Displays selected IF Bandwidth. Selections include 15 and 300 kHz.

Soft Function Keys available with this function include:

F1 300 kHz
Selects 300 kHz bandpass filter as active filter.

F2 15 kHz
Selects 15 kHz bandpass filter as active filter.

8. AF GEN OUT Field

Pressing ENTER, when cursor is on this field, accesses setup menu for AF Generator sources. Menu displays each source individually. Sources available include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator) and DATA (DATA Generator).

Soft Function Keys available with this function include:

F1 ZOOM
Expands window to allow editing of Audio/Data Generators. Soft Function Keys available with this function are:

F1 GEN1
Accesses GEN1 Setup Menu.

F2 GEN2
Accesses GEN2 Setup Menu.

F3 DATA
Accesses DATA Setup Menu.

F4 DTMF
Accesses DTMF Setup Menu.

F6 RETURN
Returns unit to normal RF Receive Operation.

9. AUDIO/DATA FILTERS Block

Displays current filter information for selected analog signal. Selections include Modulation Meters Line, DTMF/SINAD Line, AF Counter Line, Data Decode Line and Speaker/Headphones Line.

10. Tone/Data Code Field

Displays selected Tone/Data Type and decoded data. Selections for Tone/Data Type available with standard COM-120B include:

DCS DTMF USER
DCS INV (DCS Inverted)

Additional selections are shown, but are unusable unless Option 09 or Option 11 is installed. Additional selections available include:

CCIR CCIRH CCIRH4
EEA EIA NATEL
ZVEI DZVEI DDZVEI
EURO 5/6 TONE POCSAG
POCSAG/ (POCSAG Inverted)

Soft Function Keys available with this function include:

F1 MENU
Displays TONE/DATA Type selections.

F6 RETURN
Returns COM-120B to normal RF Receive Operation.

F2 DECODE
Activates DECODE Function for specified Audio/Data type. Accesses Tone Decode Screen for USER Defined signalling format and initiates decoding function for DCS and DCS Inverted Functions.

Soft Function Keys available with USER selected for TONE/DATA Type include:

F3 CONFIG
Accesses Configuration Window for configuring User Selectable Frequency and Duration for codes 0 through 9 and A through T. With Configuration Window active, Soft Function Keys are defined as follows:

F1 PG UP
Used to scroll up through Configuration Window.

F2 PG DN
Used to scroll down through Configuration Window.

F3 FILL
Fills remainder of column with value of current cursor position.

F6 RETURN
Exits Configuration Window into normal RF Receive operation.

11. DISTORTION/SINAD/MODULATION Reading

Displays distortion reading of received signal if Distortion is selected. Displays SINAD reading of received signal if SINAD is selected. Displays modulation reading in units of selected DEMOD Type (5) if Modulation is selected. This field is interactive with DISTORTION/ SINAD/MODULATION Meter (12). This field displays reading only when DISTORTION/SINAD/MODULATION Meter (12) displays meter. The same reading cannot be displayed twice. Selection of a specific reading changes source of nonedited field to another source

Soft Function Keys available with this function include:

F1 ZOOM
Selects Meter Operation Screen of currently active meter.

F2 SINAD
Selects SINAD reading as active. Blank if SINAD currently active.

F3 DIST
Selects Distortion reading as active. Blank if DIST currently active.

F4 DEV
Selects Modulation reading as active. Blank if DEV currently active. Modulation reading unit type is dependent on Demodulation Type (6).

12. DISTORTION/SINAD/MODULATION Meter

Displays distortion reading of received signal if Distortion is selected. Displays SINAD reading of received signal if SINAD is selected. Displays modulation reading in units of selected DEMOD Type (5) if Modulation is selected. This field is interactive with DISTORTION/ SINAD/MODULATION Reading (11). This field displays complete meter when DISTORTION/SINAD/MODU-LATION Reading (11) displays

reading only. The same reading cannot be displayed twice. Selection of a specific reading changes source of nonedited field to other source. One source must always be Modulation.

Soft Function Keys available with this function include:

F1 ZOOM
Selects Meter Operation Screen of currently active meter.

F2 SINAD
Selects SINAD Meter as active meter. Blank if SINAD currently active.

F3 DIST
Selects Distortion Meter as active meter. Blank if DIST currently active.

F4 DEV
Selects Modulation Meter as active meter. Blank if DEV currently active. Modulation reading unit type is tied to Demodulation Type (5).

13. Soft Function Key Definitions

Functions are redefined with each field of the current operation screen.

14. Power/Received Level Meter

Power Meter displays power level of signal received through T/R Connector only in dB and Watts. RECEIVED LEVEL Meter displays referenced Power Level of signal received through ANTENNA Connector only in dBm and µV.

Soft Function Keys available with this function include:

F1 ZOOM
Selects Meter Operation Screen of currently active meter.

15. RF ERROR Meter

Displays difference in RF Field (2) and frequency of received signal.

Soft Function Keys available with this function include:

F1 ZOOM
Selects Meter Operation Screen of RF ERROR Meter.

16. AF FREQUENCY Counter

Displays Audio Frequency of received signal.

Soft Function Keys available with this function include:

F1 ZOOM
Selects Meter Operation Screen of AF FREQUENCY Counter.

17. Scan Width

Displays current Scan Width. This field is editable. Available Scan Widths include:

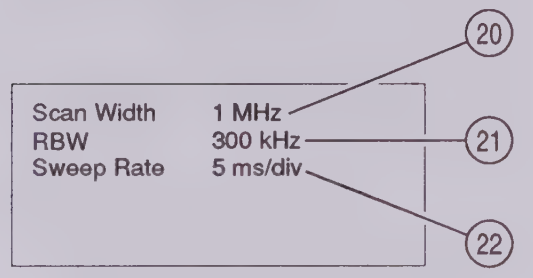
0 kHz	1 kHz	2 kHz
5 kHz	10 kHz	20 kHz
50 kHz	100 kHz	200 kHz
500 kHz	1 MHz	

Soft Function Keys available with this function include:

F1 MENU
Selects a Scan Width pop up menu.

F6 RETURN
Returns to Receive Operation Meter screen.

F2 CONFIG
Accesses a pop up screen to configure Scan width, RBW (Resolution Bandwidth) and Sweep rate.



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18. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

19. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions.

Soft Function Keys available with this function include:

F1 ZOOM
Accesses expanded version of active function.

F2 ANALY/SCOPE
Accesses inactive function. If SCOPE is active, displays ANALY. If ANALYZER is active, displays SCOPE.

20. Scan Width

Displays current Analyzer Scan Width. This field is editable. Available Scan Widths include:

0 kHz	1 kHz	2 kHz
5 kHz	10 kHz	20 kHz
50 kHz	100 kHz	200 kHz
500 kHz	1 MHz	

Soft Function Keys available with this function include:

F1 COUPLE
Sets the Sweep and RBW to factory default state for the current scan width.

F6 RETURN
Returns to normal operation mode.

21. RBW (Resolution Bandwidth

Displays current Analyzer Resolution Bandwidth. This field is editable. Available Resolution Bandwidths include:

300 Hz	3 kHz	30 kHz
300 kHz	3 MHz	

Soft Function Keys available with this function include:

F1 COUPLE
Sets the Sweep and RBW to factory default state for the current scan width.

F2 DEFAULT
Sets only the current field to factory default state for the current scan width.

F6 RETURN
Returns to normal operation mode.

22. Sweep Rate

Displays current Analyzer Sweep Rate. This field is editable. Available Sweep Rates include:

200 µs/div	500 µs/div	1 ms/div
2 ms/div	5 ms/div	10 ms/div
20 ms/div	50 ms/div	100 ms/div
200 ms/div	500 ms/div	

Soft Function Keys available with this function include:

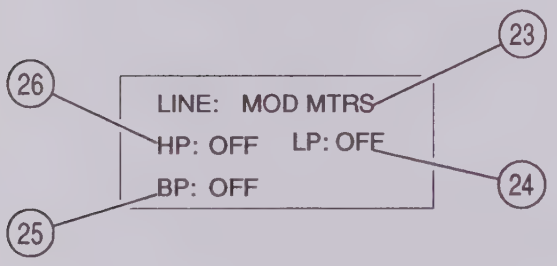
F1 COUPLE
Sets the Sweep and RBW to factory default state for the current scan width.

F2 DEFAULT
Sets only the current field to factory default state for the current scan width.

F6 RETURN
Returns to normal operation mode.

B. AUDIO/DATA FILTERS BLOCK

During RF Receiver Operation the COM-120B allows the user to configure filtering for demodulated signals passed to the AF Frequency Counter and Modulation Meters, audio signals passed to the unit through the AUDIO/DATA IN Connector to the AF Decode Line and Data Decode Line (for digital data). The Speaker/Headphones output and DEMOD Connector output are configurable. Configuration is set from the RF Receiver Filters Setup Menu. Filters are not editable from the RF Receive Operation Screen. The following information is displayed on the RF Receive Operation Screen:



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23. Filter Line

Selects Audio Line for which Filter Settings are displayed. Available selections include Modulation Meters signal (MOD MTR), DTMF/SINAD signal (AF DECODE), AF Counter (AF-CNT), Data Decoder signal (DATA DEC), DEMOD Connector (DEMOD-OUT) and Speaker/ Headphones Connector (SPKR). HP Filter (23), LP Filter (21) and BP Filter (22) Fields automatically change to reflect settings for selected Line.

Soft Function Keys available with this function include:

F1 MENU
Displays Filter Line selections.

F6 RETURN
Returns COM-120B to normal RF Receive Operation.

F6 CONFIG
Accesses Audio Filter Configuration Screen for editing all input lines.

24. Low-Pass Filter (LPF)

Displays current Low Pass Filter setting for selected filter line if active. Settings displayed include OFF, 300 Hz, 4 kHz and 20 kHz.

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

25. Bandpass Filter (BPF)

Displays current Bandpass Filter setting for selected filter line if active. Settings displayed include OFF and C-MSG.

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

26. High-Pass Filter (HPF)

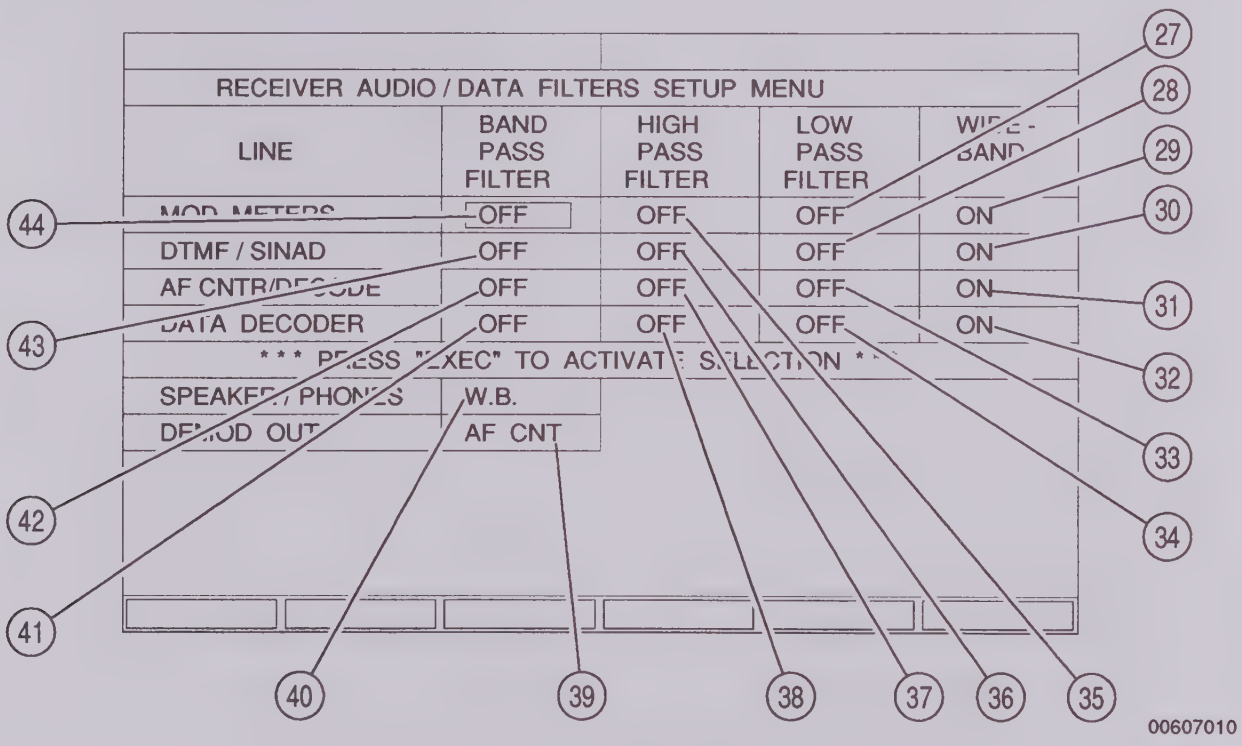
Displays current High-Pass Filter setting for selected filter line if active. Settings displayed include OFF, 300 Hz and 4 kHz.

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Pressing CONFIG Soft Function Key F6 when the cursor is at Filter Line (23) accesses the RF Receiver Filters Setup Menu. The RF Receiver Filters Setup Menu is set up in a matrix format. Each row is a separate audio line. Each column is a separate filter line. The audio lines are the DTMF/SINAD Line and the DATA DECODER Line. The Speaker/Headphones is on a separate row for editing filtering parameters. Specific filter columns are Bandpass Filter, High-Pass Filter, Low-Pass Filter and Wide Band Filter. Filter parameters for all RF Receiver Audio/Data Lines are editable as shown:

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

EXEC Soft Function Key F5 must be pressed after edits are made for edits to be valid when returning to any other operation mode.



27. MOD METERS Low-Pass Filter Field

Displays current setting for MOD METERS Low-Pass Filter. Settings available include OFF, 300 Hz, 4 kHz and 20 kHz. Setting this field to anything other than OFF automatically sets MOD METERS Bandpass Filter Field (44) to OFF.

Soft Function Keys available with this function include:

F1 OFF
Deactivates Low-Pass Filtering on MOD METERS Line.

F2 300 Hz
Routes MOD METERS Signal through 300 Hz Low-Pass Filter.

F3 4 kHz
Routes MOD METERS Signal through 4 kHz Low-Pass Filter.

F4 20 kHz
Routes MOD METERS Signal through 20 kHz Low-Pass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to operation mode.

F6 RETURN
Returns to RF Receive Operation Screen after edits are executed.

ESCAPE
Returns to RF Receive Operation Screen without saving edits when Filter field(s) are edited and not executed.

28. DTMF/SINAD Low-Pass Filter Field

Displays current setting for DTMF/SINAD Low-Pass Filter. Settings available include OFF, 300 Hz, 4 kHz and 20 kHz. Setting this field to anything other than OFF automatically sets DTMF/SINAD Bandpass Filter Field (43) to OFF.

Soft Function Keys available with this function include:

F1 OFF
Deactivates Low-Pass Filtering on DTMF/SINAD Line.

F2 300 Hz
Routes DTMF/SINAD Signal through 300 Hz Low-Pass Filter.

F3 4 kHz
Routes DTMF/SINAD Signal through 4 kHz Low-Pass Filter.

F4 20 kHz
Routes DTMF/SINAD Signal through 20 kHz Low-Pass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to operation mode.

F6 RETURN
Returns to RF Receive Operation Screen after edits are executed.

ESCAPE
Returns to RF Receive Operation Screen without saving edits when Filter field(s) are edited and not executed.

29. MOD METERS Wideband Filter Field

Displays ON if all other filtering is OFF for MOD METERS Signal. Displays OFF if filter is used for MOD METERS signal. This field is for display only.

30. DTMF/SINAD Wideband Filter Field

Displays ON if all other filtering is OFF for DTMF/SINAD Signal. Displays OFF if filter is used for DTMF/SINAD signal. This field is for display only.

31. AF COUNTER Wideband Filter Field

Displays ON if all other filtering is OFF for AF COUNTER Signal. Displays OFF if filter is used for AF COUNTER signal. This field is for display only.

32. DATA DECODER Wideband Filter Field

Displays ON if all other filtering is OFF for DATA DECODER Signal. Displays OFF if filter is used for DATA DECODER signal. This field is for display only.

33. AF COUNTER Low-Pass Filter Field

Displays current setting for AF COUNTER Low-Pass Filter. Settings available include OFF, 300 Hz, 4 kHz and 20 kHz. Setting this field to anything other than OFF automatically sets AF COUNTER Bandpass Filter Field (42) to OFF.

Soft Function Keys available with this function include:

F1 OFF
Deactivates Low-Pass Filtering on AF COUNTER Line.

F2 300 Hz
Routes AF COUNTER Signal through 300 Hz Low-Pass Filter.

F3 4 kHz
Routes AF COUNTER Signal through 4 kHz Low-Pass Filter.

F4 20 kHz
Routes AF COUNTER Signal through 20 kHz Low-Pass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to operation mode.

F6 RETURN
Returns to RF Receive Operation Screen after edits are executed.

ESCAPE
Returns to RF Receive Operation Screen without saving edits when Filter field(s) are edited and not executed.

34. DATA DECODER Low-Pass Filter Field

Displays current setting for DATA DECODER Low-Pass Filter. Settings available include OFF, 300 Hz, 4 kHz and 20 kHz. Setting this field to anything other than OFF automatically sets DATA DECODER Bandpass Filter Field (41) to OFF.

Soft Function Keys available with this function include:

F1 OFF
Deactivates Low-Pass Filtering on DATA DECODER Line.

F2 300 Hz
Routes DATA DECODER Signal through 300 Hz Low-Pass Filter.

F3 4 kHz
Routes DATA DECODER Signal through 4 kHz Low-Pass Filter.

F4 20 kHz
Routes DATA DECODER Signal through 20 kHz Low-Pass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to operation mode.

F6 RETURN
Returns to RF Receive Operation Screen after edits are executed.

ESCAPE
Returns to RF Receive Operation Screen without saving edits when Filter field(s) are edited and not executed.

35. MOD METERS High-Pass Filter Field

Displays current setting for MOD METERS High-Pass Filter. Settings available include OFF, 300 Hz and 4 kHz. Setting this field to anything other than OFF automatically sets MOD METERS Bandpass Filter Field (44) to OFF.

Soft Function Keys available with this function include:

F1 OFF
Deactivates High-Pass Filtering on MOD METERS Line.

F2 300 Hz
Routes MOD METERS Signal through 300 Hz High-Pass Filter.

F3 4 kHz
Routes MOD METERS Signal through 4 kHz High-Pass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to operation mode.

F6 RETURN
Returns to RF Receive Operation Screen after edits are executed.

ESCAPE
Returns to RF Receive Operation Screen without saving edits when Filter field(s) are edited and not executed.

36. DTMF/SINAD High-Pass Filter Field

Displays current setting for DTMF/SINAD High-Pass Filter. Settings available include OFF, 300 Hz and 4 kHz. Setting this field to anything other than OFF automatically sets DTMF/SINAD Bandpass Filter Field (43) to OFF.

Soft Function Keys available with this function include:

F1 OFF
Deactivates High-Pass Filtering on DTMF/SINAD Line.

F2 300 Hz
Routes DTMF/SINAD Signal through 300 Hz High-Pass Filter.

F3 4 kHz
Routes DTMF/SINAD Signal through 4 kHz High-Pass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to operation mode.

F6 RETURN
Returns to RF Receive Operation Screen after edits are executed.

ESCAPE
Returns to RF Receive Operation Screen without saving edits when Filter field(s) are edited and not executed.

37. AF COUNTER High-Pass Filter Field

Displays current setting for AF COUNTER High-Pass Filter. Settings available include OFF, 300 Hz and 4 kHz. Setting this field to anything other than OFF automatically sets AF COUNTER Bandpass Filter Field (42) to OFF.

Soft Function Keys available with this function include:

F1 OFF
Deactivates High-Pass Filtering on AF COUNTER Line.

F2 300 Hz
Routes AF COUNTER Signal through 300 Hz High-Pass Filter.

F3 4 kHz
Routes AF COUNTER Signal through 4 kHz High-Pass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to operation mode.

F6 RETURN
Returns to RF Receive Operation Screen after edits are executed.

ESCAPE
Returns to RF Receive Operation Screen without saving edits when Filter field(s) are edited and not executed.

38. DATA DECODER High-Pass Filter Field

Displays current setting for DATA DECODER High-Pass Filter. Settings available include OFF, 300 Hz and 4 kHz. Setting this field to anything other than OFF automatically sets DATA DECODER Bandpass Filter Field (41) to OFF.

Soft Function Keys available with this function include:

F1 OFF
Deactivates High-Pass Filtering on DATA DECODER Line.

F2 300 Hz
Routes DATA DECODER Signal through 300 Hz High-Pass Filter.

F3 4 kHz
Routes DATA DECODER Signal through 4 kHz High-Pass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to operation mode.

F6 RETURN
Returns to RF Receive Operation Screen after edits are executed.

ESCAPE
Returns to RF Receive Operation Screen without saving edits when Filter field(s) are edited and not executed.

39. DEMOD Connector Filter Field

Displays current setting for DEMOD Connector Signal. One selection is the demodulated signal passed through a C-Message Weighted Filter. Other selections route the signals passed to other sections of the COM-120B to the DEMOD Connector. These signals include:

AF Counter Signal (AF CNT)
Unfiltered Demodulation Signal from the Detector (DET-OUT)
Data Decoder Signal (DAT DEC)
AF Decode/SINAD Signal (AF DECD)
Modulation Meter Signal (MOD MTR)

Soft Function Keys available with this function include:

F1 AF-CNT
Routes AF Counter Signal to DEMOD Connector.

F2 DET-OUT
Routes Detector Signal to DEMOD Connector.

F3 C-MSG
Routes Detector Signal through C-Message Weighted Filter to DEMOD Connector.

F4 DAT DEC
Routes Data Decoder Signal to DEMOD Connector.

F5 AF DECD
Routes AF Decoder/SINAD Signal to DEMOD Connector.

F6 MOD MTR
Routes Modulation Meters Signal to DEMOD Connector.

40. Speaker/Headphones Filter Field

Displays current setting for Speaker/Headphones Filter. Settings available include OFF, C-MSG (C-Message Weighted Filter), W.B. (Wideband) and INT-MOD (Internal Modulation). The first three selections relate to the audio being sent to the AUDIO/DATA IN connector. The last selection is the composite modulation signal being generated by the COM-120B.

Soft Function Keys available with this function include:

F1 OFF
Sets Speaker/Headphones operation to OFF.

F2 C-MSG
Routes Audio signal from AUDIO/DATA IN Connector through C-Message Weighted Bandpass Filter to Speaker and PHONES Connector.

F3 W.B.
Routes Audio signal from AUDIO/DATA IN Connector to Speaker and PHONES Connector without filtering.

F4 Aud-Gen
Routes Audio signal from internal Audio/Data/Signaling Generators, as composite signal, to Speaker and PHONES Connector.

41. DATA DECODER Bandpass Filter Field

Displays current setting for DATA DECODER Bandpass Filter. Settings available include OFF and C-MSG. Setting this field to anything other than OFF automatically sets DATA DECODER High-Pass Filter Field (38) and DATA DECODER Low-Pass Filter Field (34) to OFF.

Soft Function Keys available with this function include:

F1 OFF
Deactivates Bandpass Filtering on DATA DECODER Line.

F2 C-MSG
Routes DATA DECODER Signal through C-Message Weighted Bandpass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to operation mode.

F6 RETURN
Returns to RF Receive Operation Screen after edits are executed.

ESCAPE
Returns to RF Receive Operation Screen without saving edits when Filter field(s) are edited and not executed.

42. AF COUNTER Bandpass Filter Field

Displays current setting for AF COUNTER Bandpass Filter. Settings available include OFF and C-MSG. Setting this field to anything other than OFF automatically sets AF COUNTER High-Pass Filter Field (37) and AF COUNTER Low-Pass Filter Field (33) to OFF.

Soft Function Keys available with this function include:

F1 OFF
Deactivates Bandpass Filtering on AF COUNTER Line.

F2 C-MSG
Routes AF COUNTER Signal through C-Message Weighted Bandpass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to operation mode.

F6 RETURN
Returns to RF Receive Operation Screen after edits are executed.

ESCAPE
Returns to RF Receive Operation Screen without saving edits when Filter field(s) are edited and not executed.

43. DTMF/SINAD Bandpass Filter Field

Displays current setting for DTMF/SINAD Bandpass Filter. Settings available include OFF and C-MSG. Setting this field to anything other than OFF automatically sets DTMF/SINAD High-Pass Filter Field (36) and DTMF/SINAD Low-Pass Filter Field (28) to OFF.

Soft Function Keys available with this function include:

F1 OFF
Deactivates Bandpass Filtering on DTMF/SINAD Line.

F2 C-MSG
Routes DTMF/SINAD Signal through C-Message Weighted Bandpass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to operation mode.

F6 RETURN
Returns to RF Receive Operation Screen after edits are executed.

ESCAPE
Returns to RF Receive Operation Screen without saving edits when Filter field(s) are edited and not executed.

44. MOD METERS Bandpass Filter Field

Displays current setting for MOD METERS Bandpass Filter. Settings available include OFF and C-MSG. Setting this field to anything other than OFF automatically sets MOD METERS High-Pass Filter Field (35) and MOD METERS Low-Pass Filter Field (27) to OFF.

Soft Function Keys available with this function include:

F1 OFF
Deactivates Bandpass Filtering on MOD METERS Line.

F2 C-MSG
Routes MOD METERS Signal through C-Message Weighted Bandpass Filter.

F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to operation mode.

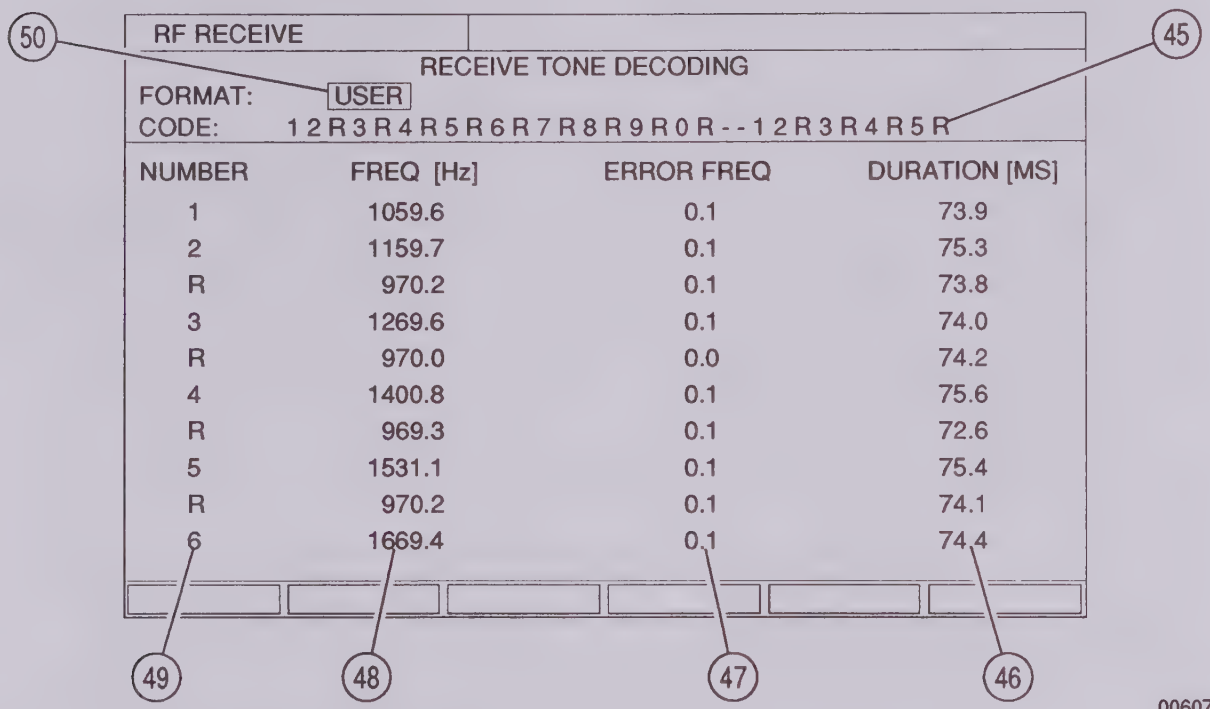
F6 RETURN
Returns to RF Receive Operation Screen after edits are executed.

ESCAPE
Returns to RF Receive Operation Screen without saving edits when Filter field(s) are edited and not executed.

C. DECODING SCREENS

Pressing DECODE Soft Function Key F2 from TONE/DATA CODE Field (11) accesses Tone Decode Screen when Tone/Data Type is Signalling Format.

Information provided the user from the Tone Decode Screen is displayed below:



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45. Code Field

Displays Decoded message by character.

46. DURATION Column

Displays Duration of each message element in milliseconds (ms).

47. ERROR FREQ Column

Displays difference of received tone frequency from expected tone for each message element in percentage (%).

48. FREQ Column

Displays received tone frequency for each message element in Hertz (Hz).

49. NUMBER Column

Displays each character in message.

50. FORMAT

Displays selected Signalling Format for decoding. Selections are limited to USER for standard configuration. Additional selections are shown, but are unusable unless Option 09 or Option 11 is installed. Additional selections available include:

TONE	CCIRH
TONE REMOTE	CCIRH4
USER	NATEL
EEA	EURO
EIA	5/6 TONE
ZVEI	10 PS
DZVEI	20 PS
DDZVEI	MTS
CCIR	

Soft Function Keys available with this function include:

F1 MENU
Displays Menu of Signalling Format selections.

F2 DECODE
Activates Decode Function. Field is highlighted when Decode Function is active.

F3 PG UP
Pages screen up to view decoded information.

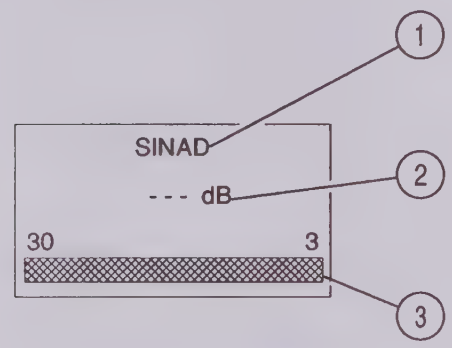
F4 PG DN
Pages screen down to view decoded information.

F6 RETURN
Returns to RF Receive Operation Screen.

D. SINAD METER

The RF Receive Operation Screen SINAD Meter measures SINAD for a 1 kHz tone modulation for an RF signal passed to the RF Receiver. The RF signal is demodulated and filtered before being passed to the SINAD Meter. Filtering for the signal passed to the SINAD Meter is provided by the Audio/Data Filters.

The SINAD Meter can be shown as reading in dB only or as a meter. Information provided from the RF Receive Operation Screen is displayed as follows:



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1. SINAD/Distortion/Modulation Meter Label

   Displays label for selected Meter Operation. Selections include SINAD, Distortion and Modulation Meters.

Soft Function Keys available with this function include:

F1 ZOOM
Expands current meter into full-size meter.

F2 SINAD
Selects SINAD Meter as active meter. Not displayed if meter is active.

F3 DIST
Selects Distortion Meter as active meter. Not displayed if meter is active.

F4 DEV
Selects Modulation Meter associated with Demodulation type as active meter. Not displayed if meter is active.

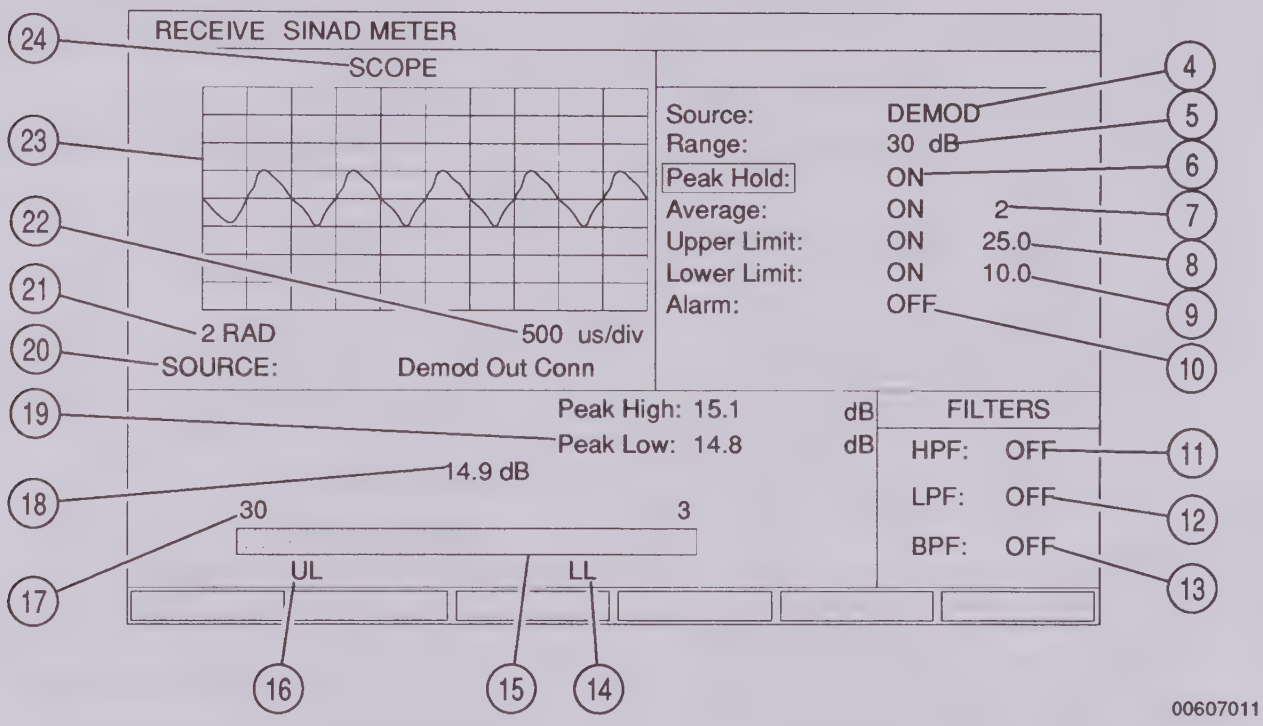
2. Meter Reading

   Displays current SINAD Meter Reading in dB.

3. Meter Bar

   Provides graphical display of current SINAD Meter reading in dB.

Pressing ZOOM Soft Function Key F1 when cursor is at SINAD/Distortion/Modulation Meter Label (1) accesses full screen SINAD Meter. Available features and editable fields are as follows:



4. Source

Displays DEMOD, indicating signal source for SINAD measurement is demodulated signal. Field is for display only.

5. Range

Displays selected SINAD Meter Upper Range. Selections include Autorange, 15 dB and 30 dB.

Soft Function Keys available with this function include:

F1 15 dB
Selects 15 dB as active upper range for SINAD Meter.

F2 30 dB
Selects 30 dB as active upper range for SINAD Meter.

F3 AUTO
Selects Autorange as active upper range for SINAD Meter. This setting automatically adjusts to a higher or lower upper range if signal increases or decreases to a specified level of the current setting.

F5 RST PK
Resets Peak Readings displayed to 0.

F6 RETURN
Returns Test Set to normal RF Receive Operation Screen.

6. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. Remains OFF in Autorange. When ON, Peak Readings (19) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

7. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages a selected number of readings and reports average as Digital Readout (18). Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

8. Upper Limit

Displays current status of upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0 to 30 dB. When ON, Upper Limit Bar (16) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

9. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range is 0 to 30 dB. When ON, Lower Limit Bar (14) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

10. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, alarm sounds when signal exceeds Upper Limit (8) or is below Lower Limit (9).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

11. High-Pass Filter (HPF)

Displays current High-Pass Filter setting for SINAD Meter.

12. Low-Pass Filter (LPF)

Displays current Low-Pass Filter setting for SINAD Meter.

13. Bandpass Filter (BPF)

Displays current Bandpass Filter setting for SINAD Meter.

14. Lower Limit Bar

Indicates position of Lower Limit (9) on Bar Meter (15). If Lower Limit (9) exceeds Range (5), marker is not visible.

15. Bar Meter

Relative Graphic display of current SINAD Meter reading.

16. Upper Limit Bar

Indicates position of Upper Limit (8) on Bar Meter (15). If Upper Limit (8) exceeds Range (5), marker is not visible.

17. Upper Range Limit Readout

Displays current value of Range (5). Redefined as needed if Autorange function is active.

18. Digital Readout

Displays current SINAD Meter Reading.

19. Peak Readings

Displays current high and low Peak Readings when Peak Hold (6) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

20. Source Signal

Displays type of signal source. Available selections for this field include:

Scope/DVM - Gnd
Scope/DVM - AC
Scope/DVM - DC
Detector Out
Audio/Data/Gen Out
Notch Residual
AF Cntr
DTMF/SINAD
Data Decoder
RF Power
Demod Out Conn
Mod Meters

21. OSCILLOSCOPE Scale

Displays editable Oscilloscope Vertical Scale. Vertical Scale value and range selections is dependent on Source. Scales available include:

For Scope/DVM - Gnd, AC, DC:

10 mV	20 mV	50 mV
100 mV	200 mV	500 mV
1 V	2 V	5 V
10 V	20 V	50 V

For Detector Out, DTMF/SINAD, Data Decoder and Mod Meters:

FM Deviation Meter Range <20 kHz

0.1 kHz	0.2 kHz	0.5 kHz
1 kHz	2 kHz	5 kHz

FM Deviation Meter Range ≥20 kHz

0.2 kHz	0.4 kHz	1 kHz
2 kHz	4 kHz	10 kHz

FM Deviation Meter Range 50 kHz

0.5 kHz	1 kHz	2.5 kHz
5 kHz	10 kHz	25 kHz

FM Deviation Meter Range 100 kHz

1 kHz	2 kHz	5 kHz
10 kHz	20 kHz	50 kHz

PM Modulation Meter

.1 Rad	.2 Rad	.5 Rad
1 Rad	2 Rad	5 Rad

AM Modulation Meter

20% Fixed

For Audio/Data/Gen Out, Notch Residual, AF Cntr and Demod Out Conn:

0.02	0.04	0.10
0.20	0.40	1.00

For RF Power:
LOW MED HIGH

Soft Function Keys available with this function include:

F1 MENU
Displays a pop up menu with Vertical Scale selections.

F2 RETURN
Exits Menu into normal operation.

22. Sweep Rate

Displays current Oscilloscope Sweep Rate. This field is editable. Available Sweep Rates include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	

23. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

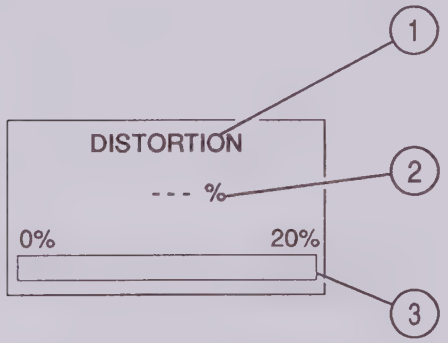
24. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions.

E. DISTORTION METER

The Distortion Meter for the RF Receive Operation Screen measures Percent Distortion for a 1 kHz tone modulation for an RF signal passed to the RF Receiver. The RF signal is demodulated and filtered before being passed to the Distortion Meter. Filtering for the signal passed to the Distortion Meter is provided by the Audio/Data Filters.

The Distortion Meter can be shown as reading in % Distortion only or as a meter. Information provided from the RF Receive Operation Screen is displayed as follows:



8717044

1. SINAD/Distortion/Modulation Meter Label

   Displays label for selected Meter Operation. Selections include SINAD, Distortion and Modulation Meters.

Soft Function Keys available with this function include:

F1 ZOOM
Expands current meter into full-size meter.

F2 SINAD
Selects SINAD Meter as active meter. Not displayed if meter is active.

F3 DIST
Selects Distortion Meter as active meter. Not displayed if meter is active.

F4 DEV
Selects Modulation Meter associated with Demodulation type as active meter. Not displayed if meter is active.

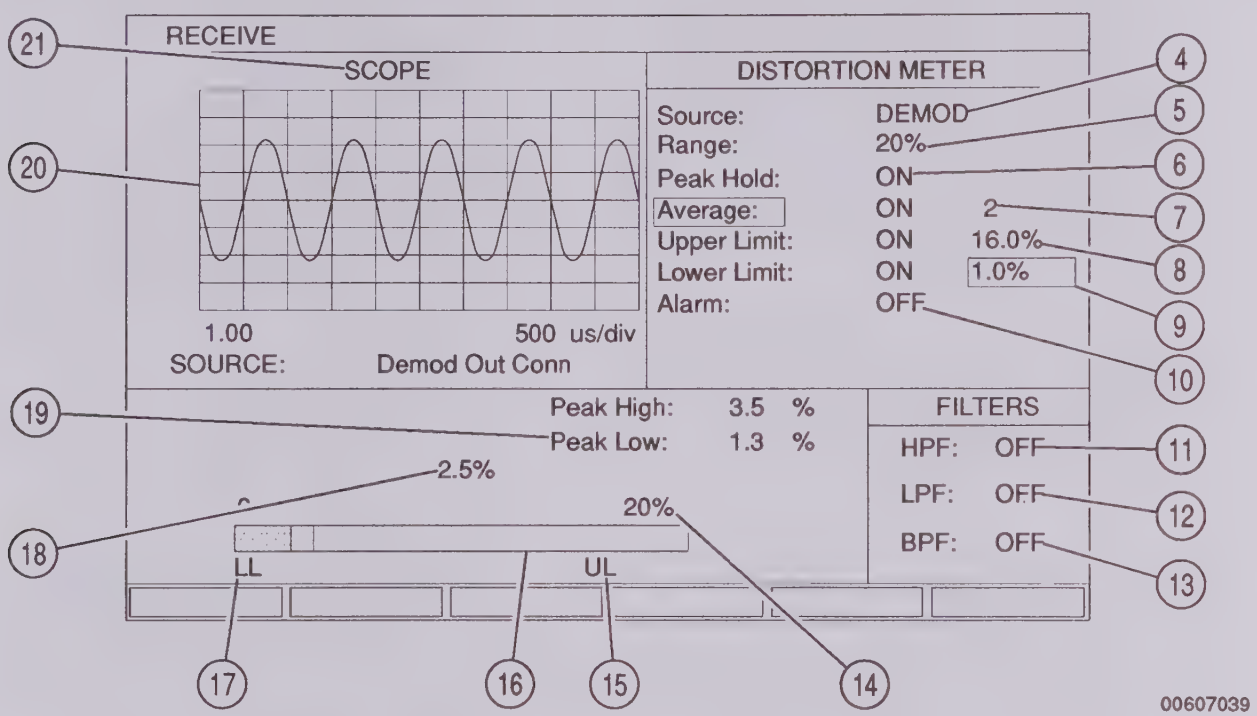
2. Meter Reading

   Displays current Distortion Meter Reading in % Distortion.

3. Meter Bar

   Provides graphical display of current Distortion Meter reading in % Distortion.

Pressing ZOOM Soft Function Key F1 when cursor is at SINAD/Distortion/Modulation Meter Label (1) accesses full screen Distortion Meter. Available features and editable fields are listed as follows:



4. Source

Displays DEMOD, indicating signal source for Distortion measurement is demodulated signal. Field is for display only.

5. Range

Displays Distortion Meter Upper Range of 20%. Field is for display only.

6. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. When ON, Peak Readings (19) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

7. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaing Function averages selected number of readings and reports average as Digital Readout (18). Range of samples is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

8. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range of value is 0 to 20%. When ON, Upper Limit Bar (15) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

9. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range of value is 0 to 20%. When ON, Lower Limit Bar (17) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

10. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (8) or is below Lower Limit (9).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

11. High-Pass Filter (HPF)

Displays current High-Pass Filter setting for Distortion Meter.

12. Low-Pass Filter (LPF)

Displays current Low-Pass Filter setting for Distortion Meter.

13. Bandpass Filter (BPF)

Displays current Bandpass Filter setting for Distortion Meter.

14. Upper Range Limit Readout

Displays current value of Range (5). Redefined as needed if Autorange function is active.

15. Upper Limit Bar

Indicates position of Upper Limit (8) on Bar Meter (16). If Upper Limit (8) exceeds Range (5), marker is not visible.

16. Bar Meter

Relative Graphic display of current Distortion Meter reading.

17. Lower Limit Bar

Indicates position of Lower Limit (9) on Bar Meter (14). If Lower Limit (9) exceeds Range (5), marker is not visible.

18. Digital Readout

Displays current Distortion Meter Reading.

19. Peak Readings

Displays current high and low Peak readings when Peak Hold (6) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

20. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

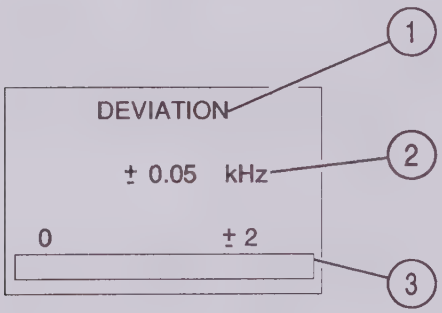
21. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions.

F. FM DEVIATION METER

The FM Deviation Meter for the RF Receive Operation Screen measures FM Deviation for an RF signal passed to the RF Receiver. The RF signal is demodulated and filtered before being passed to the FM Deviation Meter. Filtering for the signal passed to the FM Deviation Meter is provided by the Audio/Data Filters.

The FM Deviation Meter can be shown as reading in kHz only or as a meter. Information provided from the RF Receive Operation Screen is displayed as follows:



00607074

1. SINAD/Distortion/Modulation Meter Label

   Displays label for selected Meter Operation. Selections include SINAD, Distortion and Modulation Meters.

Soft Function Keys available with this function include:

F1 ZOOM
Expands current meter into full-size meter.

F2 SINAD
Selects SINAD Meter as active meter. Not displayed if meter is active.

F3 DIST
Selects Distortion Meter as active meter. Not displayed if meter is active.

F4 DEV
Selects Modulation Meter associated with Demodulation type as active meter. Not displayed if meter is active.

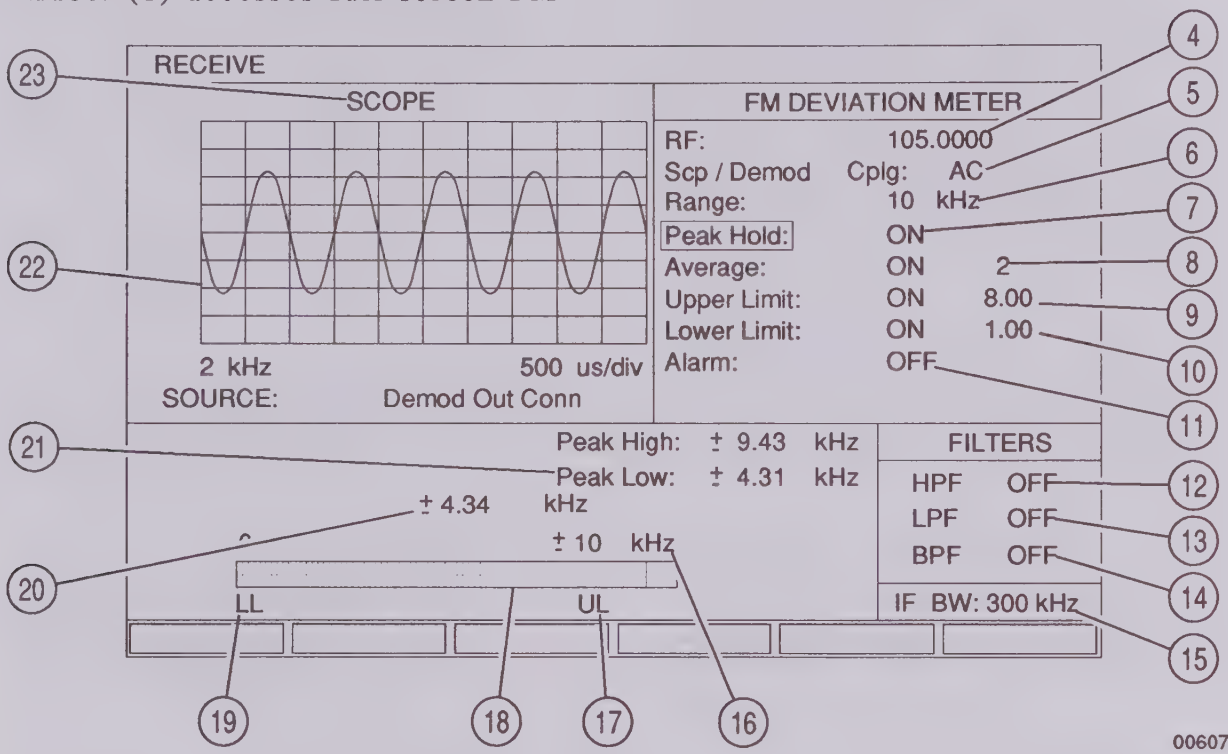
2. Meter Reading

   Displays current FM Deviation Meter Reading in kHz.

3. Meter Bar

   Provides graphical display of current FM Deviation Meter reading in kHz.

Pressing ZOOM Soft Function Key F1 when cursor is at SINAD/Distortion/Modulation Meter Label (1) accesses full screen FM Deviation Meter. Available features and editable fields are as follows:



4. RF

Displays selected RF Receiver Frequency. Selections range from .000 to 1000 MHz.

5. Scope/DEMOD Connector Coupling

Displays selected coupling for Oscilloscope and DEMOD Connector. Selections are AC or DC.

Soft Function Keys available with this function include:

F1 AC
Selects AC Coupling for Oscilloscope and DEMOD Connector.

F2 DC
Selects DC Coupling for Oscilloscope and DEMOD Connector.

F5 FM-Z
Automatically calibrates FM Zero.

F6 RETURN
Returns unit to RF Receive Operation Screen.

6. Range

Displays selected FM Deviation Meter Upper Range. Selections include Autorange and the following:

2 kHz	5 kHz	10 kHz
20 kHz	50 kHz	100 kHz

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Scale.

F2 AUTO
Selects Autorange for Deviation Meter Range.

F5 RST PK
Resets Peak Deviation Meter readings.

F6 RETURN
Returns unit to RF Receive Operation Screen.

7. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. Remains OFF in Autorange. When ON, Peak Readings (21) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

8. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages selected number of readings and reports average as Digital Readout (20). Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

9. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0 to 99.99 kHz. When ON, Upper Limit Bar (17) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

10. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range is 0 to 99.99 kHz. When ON, Lower Limit Bar (19) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

11. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (9) or is below Lower Limit (10).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

12. High-Pass Filter (HPF)

Displays current High-Pass Filter setting for FM Deviation Meter.

13. Low-Pass Filter(LPF)

Displays current Low-Pass Filter setting for FM Deviation Meter.

14. Bandpass Filter (BPF)

Displays current Bandpass Filter setting for FM Deviation Meter.

15. IF Bandwidth

Displays selected IF Bandwidth. Selections include 15 and 300 kHz.

Soft Function Keys available with this function include:

F1 300 kHz
Selects 300 kHz bandpass filter as active filter.

F2 15 kHz
Selects 15 kHz bandpass filter as active filter.

16. Upper Range Limit Readout

Displays current value of Range (6). Redefined as needed if Autorange function is active.

17. Upper Limit Bar

Indicates position of Upper Limit (9) on Bar Meter (18). If Upper Limit (9) exceeds Range (6), marker is not visible.

18. Bar Meter

Relative Graphic display of current FM Deviation Meter reading.

19. Lower Limit Bar

Indicates position of Lower Limit (10) on Bar Meter (18). If Lower Limit (10) exceeds Range (6), marker is not visible.

20. Digital Readout

Displays current FM Deviation Meter Reading.

21. Peak Readings

Displays current high and low Peak readings when Peak Hold (7) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

22. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

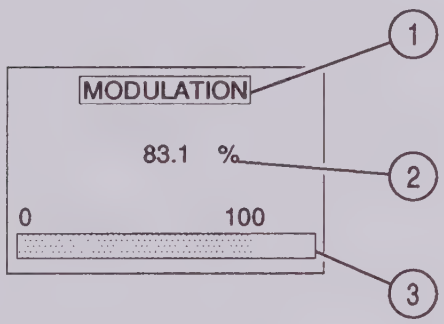
23. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions.

G. AM MODULATION METER

The AM Modulation Meter for the RF Receive Operation Screen measures AM Modulation for an RF signal passed to the RF Receiver. The RF signal is demodulated and filtered before being passed to the AM Modulation Meter. Filtering for the signal passed to the AM Modulation Meter is provided by the Audio/Data Filters.

The AM Modulation Meter can be shown as reading in % only or as a meter. Information provided from the RF Receive Operation Screen is displayed as follows:



8717058

1. SINAD/Distortion/Modulation Meter Label

   Displays label for selected Meter Operation. Selections include SINAD, Distortion and Modulation Meters.

   Soft Function Keys available with this function include:

   F1 ZOOM
   Expands current meter into full-size meter.

   F2 SINAD
   Selects SINAD Meter as active meter. Not displayed if meter is currently active.

   F3 DIST
   Selects Distortion Meter as active meter. Not displayed if meter is currently active.

   F4 DEV
   Selects Modulation Meter associated with Demodulation type as active meter. Not displayed if meter is currently active.

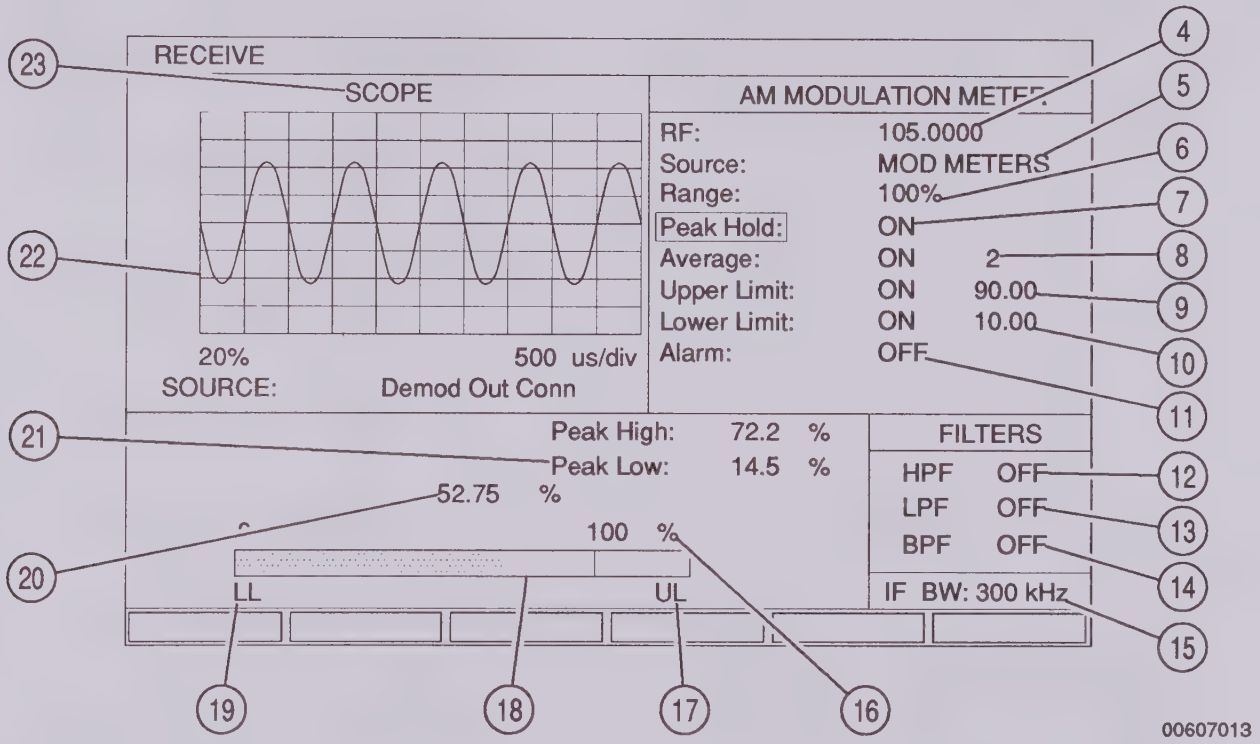
2. Meter Reading

   Displays current AM Modulation Meter Reading in % Modulation.

3. Meter Bar

   Provides graphical display of current AM Modulation Meter reading in % Modulation.

Pressing ZOOM Soft Function Key F1 when cursor is at SINAD/Distortion/ Modulation Meter Label (1) accesses full screen AM Modulation Meter. Available features and editable fields are as follows:



4. RF

Displays selected RF Receiver Frequency. Selections range from .000 to 1000 MHz.

5. Source

Displays MOD METERS as active source. Field is for display only.

6. Range

Displays selected AM Modulation Meter Upper Range. Selections include Autorange, 40% and 100%.

Soft Function Keys available with this function include:

F1 40%
Selects 40% as active upper range for AM Moduation Meter.

F2 100%
Selects 100% as active upper range for AM Modulation Meter.

F3 AUTO
Selects Autorange as active upper range for AM Modulation Meter. This setting automatically adjusts to higher or lower upper range if signal increases or decreases to specified level of current setting.

F5 RST PK
Resets Peak Deviation Meter readings.

F6 RETURN
Returns unit to RF Receive Operation Screen.

7. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. Remains OFF in Autorange. When ON, Peak Readings (21) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

8. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages selected number of readings and reports average as Digital Readout (20). Range of samples is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

9. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0% to 99.9%. When ON, Upper Limit Bar (17) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

10. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range is 0% to 99.9%. When ON, Lower Limit Bar (19) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

11. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (9) or is below Lower Limit (10).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

12. High-Pass Filter (HPF)

Displays current High-Pass Filter setting for AM Modulation Meter.

13. Low-Pass Filter (LPF)

Displays current Low-Pass Filter setting for AM Modulation Meter.

14. Bandpass Filter (BPF)

Displays current Bandpass Filter setting for AM Modulation Meter.

15. IF Bandwidth

Displays selected IF Bandwidth. Selections include 15 and 300 kHz.

Soft Function Keys available with this function include:

F1 300 kHz
Selects 300 kHz bandpass filter as active filter.

F2 15 kHz
Selects 15 kHz bandpass filter as active filter.

16. Upper Range Limit Readout

Displays current value of Range (6). Redefined as needed if Autorange function is active.

17. Upper Limit Bar

Indicates position of UPPER LIMIT (9) on Bar Meter (18). If Upper Limit (9) exceeds Range (6), marker is not visible.

18. Bar Meter

Relative Graphic display of current AM Modulation Meter reading.

19. Lower Limit Bar

Indicates position of Lower Limit (10) on Bar Meter (18). If Lower Limit (10) exceeds RANGE (6), marker is not visible.

20. Digital Readout

Displays current AM Modulation Meter Reading.

21. Peak Readings

Displays current high and low Peak readings when Peak Hold (7) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

22. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

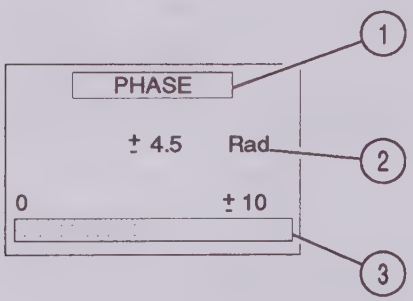
23. SCOPE/ANALYZER Prompt

Displays current operation function.
Used to toggle between two functions.

H. PHASE MODULATION METER

The Phase Modulation Meter for the RF Receive Operation Screen measures AM Modulation for an RF signal passed to the RF Receiver. The RF signal is demodulated and filtered before being passed to the Phase Modulation Meter. Filtering for the signal passed to the Phase Modulation Meter is provided by the Audio/Data Filters.

The Phase Modulation Meter can be shown as reading in Radians only or as a meter. Information provided from the RF Receive Operation Screen is displayed as follows:



00607075

1. SINAD/Distortion/Modulation Meter Label

   Displays label for selected Meter Operation. Selections include SINAD, Distortion and Modulation Meters.

   Soft Function Keys available with this function include:

   F1 ZOOM
   Expands current meter into full-size meter.

   F2 SINAD
   Selects SINAD Meter as active meter. Not displayed if meter is active.

   F3 DIST
   Selects Distortion Meter as active meter. Not displayed if meter is active.

   F4 DEV
   Selects Modulation Meter associated with Demodulation type as active meter. Not displayed if meter is active.

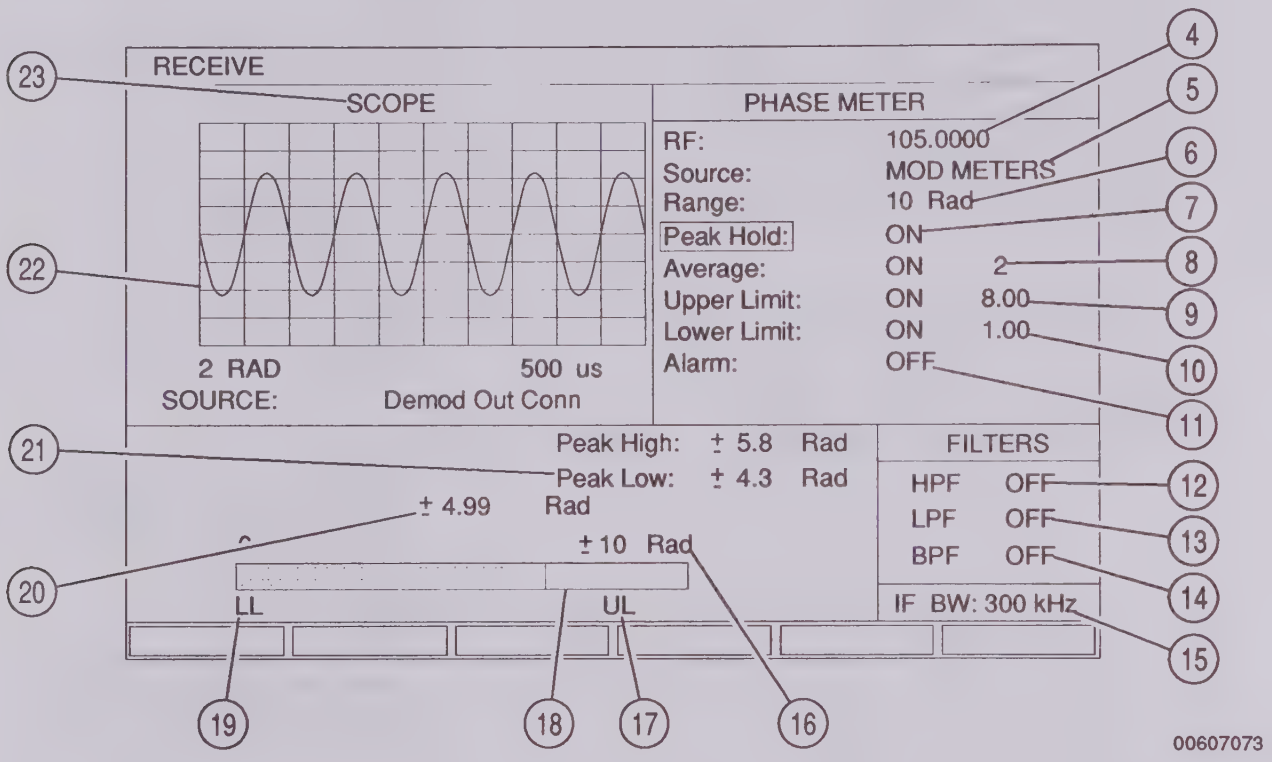
2. Meter Reading

   Displays current Phase Modulation Meter Reading in Radians.

3. Meter Bar

   Provides graphical display of current AM Modulation Meter reading in Radians.

Pressing ZOOM Soft Function Key F1 while cursor is at SINAD/Distortion/Modulation Meter Label (1) accesses full screen Phase Modulation Meter. Available features and editable fields are listed below:



4. RF

Displays selected RF Receiver Frequency. Selections range from .000 to 1000 MHz.

5. Source

Displays MOD METERS as active source. Field is for display only.

6. Range

Displays selected Phase Modulation Meter Upper Range. Selections include Autorange, 1 , 2 , 5 and 10 Radians.

Soft Function Keys available with this function include:

F1 1 RAD
Selects 1 Radian as active upper range for Phase Moduation Meter.

F2 2 RAD
Selects 2 Radians as active upper range for Phase Modulation Meter.

F3 5 RAD
Selects 5 Radians as active upper range for Phase Modulation Meter.

F4 10 RAD
Selects 10 Radians as active upper range for Phase Modulation Meter.

F5 AUTO
Selects Autorange as active upper range for Phase Modulation Meter. This setting automatically adjusts to higher or lower upper range if signal increases or decreases to specified level of current setting.

F6 RETURN
Returns unit to RF Receive Operation Screen.

7. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. Remains OFF in Autorange. When ON, Peak Readings (21) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

8. AVERAGE

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages selected number of readings and reports average as Digital Readout (20). Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

9. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0 to 9.99 Radians. When ON, Upper Limit Bar (17) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

10. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range is 0 to 9.99 Radians. When ON, Lower Limit Bar (19) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

11. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (9) or is below Lower Limit (10).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

12. High-Pass Filter (HPF)

Displays current High-Pass Filter setting for Phase Modulation Meter.

13. Low-Pass Filter (LPF)

Displays current Low-Pass Filter setting for Phase Modulation Meter.

14. Bandpass Filter (BPF)

Displays current Bandpass Filter setting for Phase Modulation Meter.

15. IF Bandwidth

Displays selected IF Bandwidth. Selections include 15 and 300 kHz.

Soft Function Keys available with this function include:

F1 300 kHz
Selects 300 kHz bandpass filter as active filter.

F2 15 kHz
Selects 15 kHz bandpass filter as active filter.

16. Upper Range Limit Readout

Displays current value of Range (6). Redefined as needed if Autorange function is active.

17. Upper Limit Bar

Indicates position of Upper Limit (9) on Bar Meter (18). If Upper Limit (9) exceeds RANGE (6), marker is not visible.

18. Bar Meter

Relative Graphic display of current Phase Modulation Meter reading.

19. Lower Limit Bar

Indicates position of Lower Limit (10) on Bar Meter (18). If Lower Limit (10) exceeds Range (6), marker is not visible.

20. Digital Readout

Displays current Phase Modulation Meter Reading.

21. Peak Readings

Displays current high and low Peak readings when Peak Hold (7) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

22. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

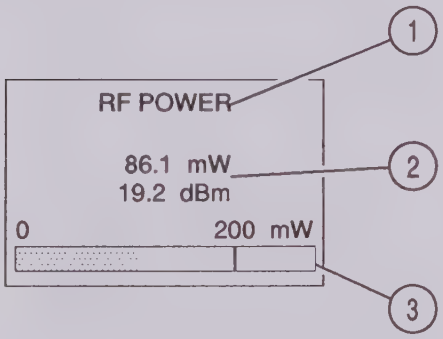
23. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions.

I. RF POWER METER

The RF Power Meter for the RF Receive Operation Screen measures RF Power for signals received at the T/R Connector. The Power Meter is visible as a miniature meter on the RF Receive Operation Screen or as full screen meter.

Information provided from the RF Receive Operation Screen is displayed as follows:



8717059

1. RF Power Meter/Received Level Meter Label

   Displays label for selected Meter Operation. Displays RF Power if T/R Connector is used for input. Displays REC LEVEL (Received Level) if ANTENNA Connector is used for input.

   Soft Function Keys available with this function include:

   F1 ZOOM
   Expands current meter into full-size meter.

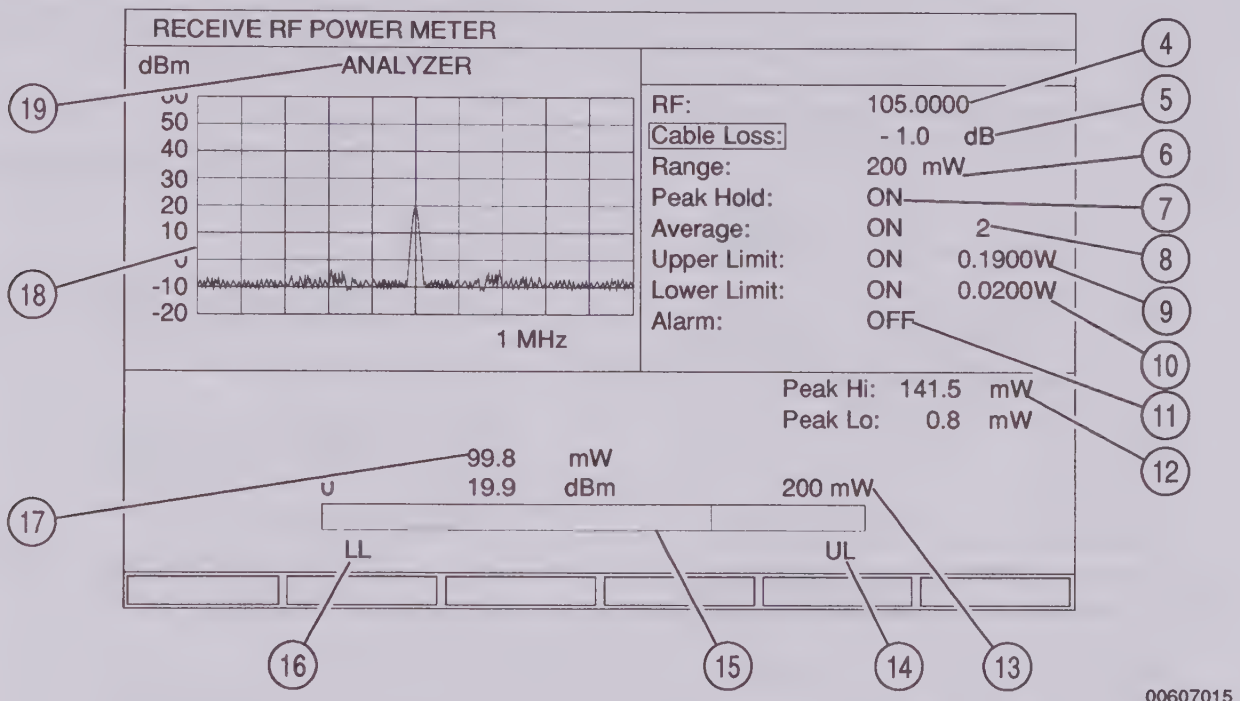
2. Meter Reading

   Displays current RF Power Reading in mW or W and dBm.

3. Meter Bar

   Provides graphical display of current RF Power Meter reading in mW or W.

Pressing ZOOM Soft Function Key F1 when cursor is at RF Power Meter/Received Level Meter Label (1) accesses full screen RF Power Meter. Available features are as follows:



4. RF

Displays RF Receiver Frequency. Selections range from .0000 to 1000 MHz.

5. Cable Loss

Displays selected gain or attenuation offset for Digital Readout (17). Gain uses positive values and attenuation uses negative values. Range is -99.9 to 99.9 dB.

F3 RE-ZERO
Sets RF Power Meter to 0 mW referenced to current input at T/R Connector.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

6. Range

Displays Meter Upper Range. Selections include Autorange and the following:

2 mW	5 mW	10 mW
20 mW	50 mW	100 mW
200 mW	500 mW	1 W
2 W	5 W	10 W
20 W	50 W	100 W
200 W		

Soft Function Keys available with this function include:

F1 MENU
Displays selections for RF Power Meter Range.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

F3 RE-ZERO
Sets RF Power Meter to 0 mW referenced to current input at T/R Connector.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

7. Peak Hold

Displays status of Peak Hold function. Displays OFF or ON. Remains OFF in Autorange. When ON, Peak Readings (17) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F3 RE-ZERO
Sets RF Power Meter to 0 mW referenced to current input at T/R Connector.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

8. Average

Displays status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages selected number of readings and reports average as Digital Readout (20). Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F3 RE-ZERO
Sets RF Power Meter to 0 mW referenced to current input at T/R Connector.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

9. Upper Limit

Displays status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0 to 200 W. When ON, Upper Limit Bar (14) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F3 RE-ZERO
Sets RF Power Meter to 0 mW referenced to current input at T/R Connector.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

10. Lower Limit

Displays status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range is 0 to 200 W. When ON, Lower Limit Bar (16) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F3 RE-ZERO
Sets RF Power Meter to 0 mW referenced to current input at T/R Connector.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

11. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Alarm sounds when signal exceeds Upper Limit (9) or is below Lower Limit (10).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F3 RE-ZERO
Sets RF Power Meter to 0 mW referenced to current input at T/R Connector.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

12. Peak Readings

Displays current high and low Peak readings when Peak Hold (7) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

13. Upper Range Limit Readout

Displays value of Range (6). Redefined as needed if Autorange function is active.

14. Upper Limit Bar

Indicates position of Upper Limit (9) on Bar Meter (15). If Upper Limit (9) exceeds Range (6), marker is not visible.

15. Bar Meter

Relative Graphic display of current Phase Modulation Meter reading.

16. Lower Limit Bar

Indicates position of Lower Limit (10) on Bar Meter (15). If Lower Limit (10) exceeds Range (6), marker is not visible.

17. Digital Readout

Displays current RF Power Meter Reading in mW or W and dBm.

18. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

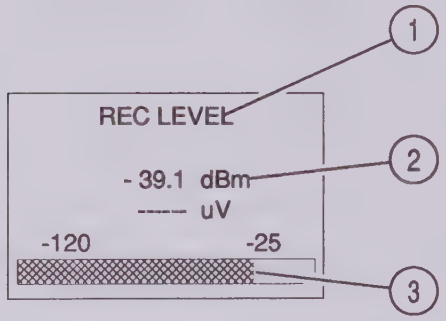
19. SCOPE/ANALYZER PROMPT

Displays current operation function.
Used to toggle between two functions.

J. RECEIVED LEVEL METER

The Received Level Meter for the RF Receive Operation Screen measures referenced RF Power for signals received at the ANTENNA Connector. The Received Level Meter is visible as a miniature meter on the RF Receive Operation Screen or as full screen meter.

Information provided from the the RF Receive Operation Screen is displayed as follows:



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1. RF Power Meter/Received Level Meter Label

   Displays label for selected Meter Operation. Displays RF Power if T/R Connector is used for input. Displays REC LEVEL (Received Level) if ANTENNA Connector is used for input.

   Soft Function Keys available with this function include:

   F1 ZOOM
   Expands current meter into full-size meter.

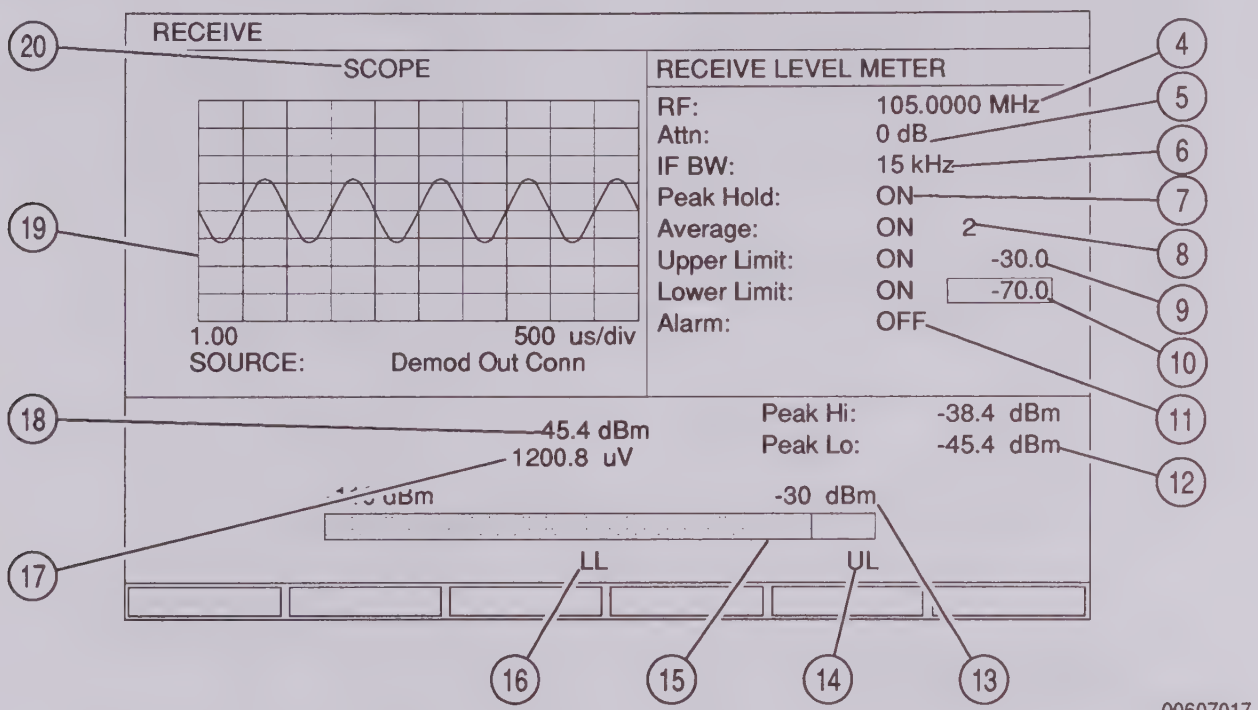
2. Meter Reading

   Displays current Received Level Meter Reading in µV and dBm.

3. Meter Bar

   Provides graphical display of current Received Level Meter reading in µV or dBm.

Pressing ZOOM Soft Function Key F1 when cursor is at RF Power Meter/Received Level Meter Label (1) accesses full screen Received Level Meter. Available features and editable fields are listed as follows:



4. RF

Displays selected RF Receiver Frequency. Selections range from .0000 to 1000 MHz.

5. Attenuation

Displays selected attenuation of input signal in dB. Displays either 0 or 30. Attenuation setting affects range of Bar Meter (15). Bar Meter (15) displays range of -110 to -30 dBm when Attenuation of 0 dB is selected. Bar Meter (15) displays range of -80 to 0 dBm when Attenuation of 30 dB is selected.

Soft Function Keys available with this function include:

F1 30 dB
Selects 30 dB Attenuation.

F2 0 dB
Selects 0 dB Attenuation.

6. IF Bandwidth

Displays selected IF Bandwidth. Selections include 15 and 300 kHz.

Soft Function Keys available with this function include:

F1 300 kHz
Selects 300 kHz bandpass filter as active filter.

F2 15 kHz
Selects 15 kHz bandpass filter as active filter.

7. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. Remains OFF in Autorange. When ON, Peak Readings (12) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F3 SET LVL
Accesses procedure for setting reference for measuring input level at current frequency.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

8. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages selected number of readings and reports average as Digital Readout (18). Range is 2 to 75.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F3 SET LVL
Accesses procedure for setting reference for measuring input level at current frequency.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

9. Upper Limit

Displays status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Ranges are -80 to 0 dBm with Attenuation (5) set to 30 dB and -130 to -30 dBm with Attenuation (5) set to 0 dB. When ON, Upper Limit Bar (14) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F3 SET LVL
Accesses procedure for setting reference for measuring input level at current frequency.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

10. Lower Limit

Displays status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Ranges are -80 to 0 dBm with Attenuation (5) set to 30 dB and -130 to -30 dBm with Attenuation (5) set to 0 dB. When ON, Lower Limit Bar (16) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F3 SET LVL
Accesses procedure for setting reference for measuring input level at current frequency.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

11. Alarm

Displays status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (9) or is below Lower Limit (10).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F3 SET LVL
Accesses procedure for setting reference for measuring input level at current frequency.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

12. Peak Readings

Displays current high and low Peak readings when Peak Hold (7) is set to ON. Readings are reinitialized whenever RST PK Soft Function Key F5 is pressed.

13. Upper Range Limit Readout

Displays current value of Upper Limit. Value depends on Attenuation (5). With Attenuation (5) set to 30 dB, displays 0 dBm. With Attenuation (5) set to 0 dB, displays -30 dBm.

14. Upper Limit Bar

Indicates position of Upper Limit (9) on Bar Meter (15).

15. Bar Meter

Relative Graphic display of current Meter reading.

16. Lower Limit Bar

Indicates position of Lower Limit (10) on Bar Meter (15).

17. Digital Readout (μV)

Displays current Received Level Meter Reading in μV.

18. Digital Readout (dBm)

Displays current Received Level Meter Reading in dBm.

19. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

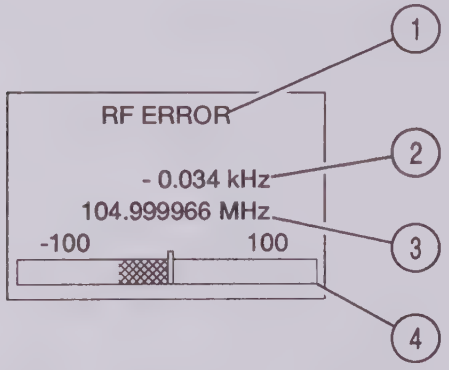
20. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions.

K. RF FREQUENCY ERROR METER

The RF Frequency Error Meter for the RF Receive Operation Screen measures the Frequency of the received signal and reports the received frequency and the difference in frequency between the received signal and the RF for the RF Receive Operation Screen. The RF Frequency Error Meter is visible as a miniature meter on the RF Receive Operation Screen or as full screen meter.

Information provided on the RF Receive Operation Screen is displayed as follows:



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1. RF Frequency Error Meter Label

   Displays label for selected Meter Operation.

   Soft Function Keys available with this function include:

   F1 ZOOM
   Expands current meter into full-size meter.

2. Error Reading

   Displays current Frequency Error of transmitter in kHz. Frequency Error is difference between the transmitted frequency and the frequency for which COM-120B is set to receive. Frequency Error is positive or negative value.

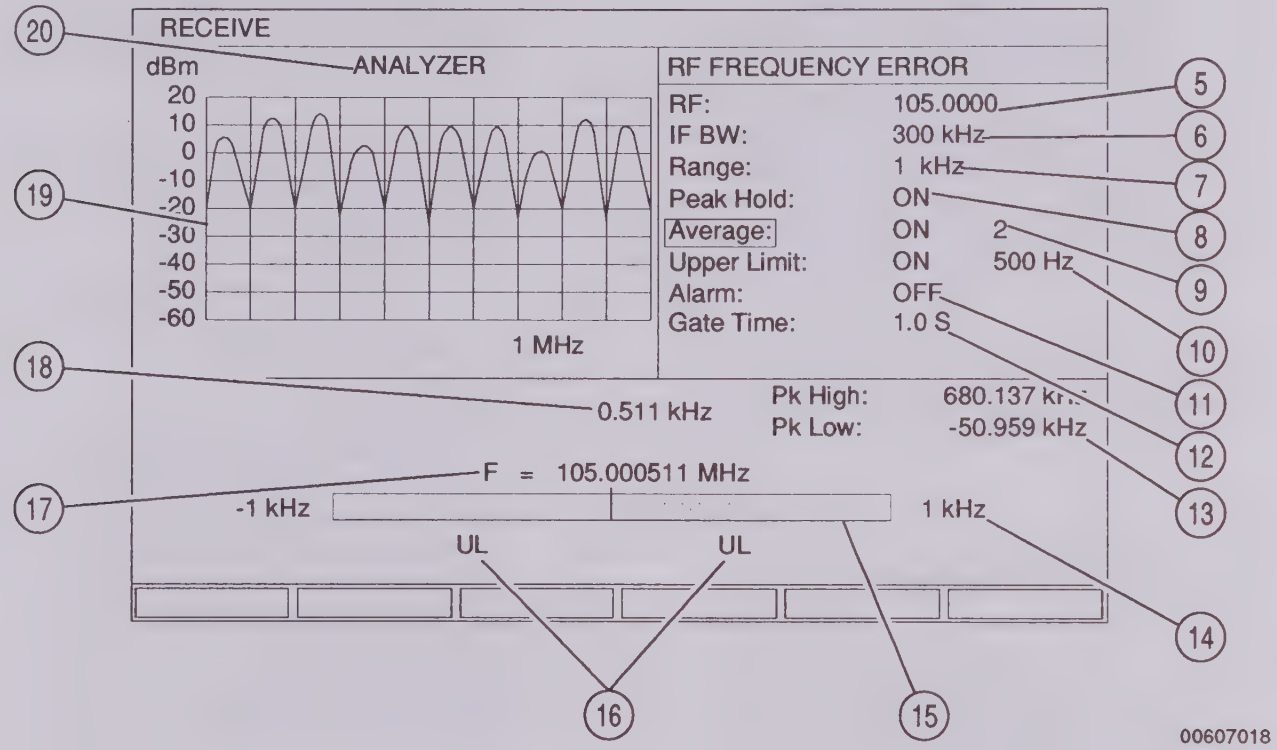
3. Frequency Reading

   Displays current Frequency of received signal in MHz.

4. Meter Bar

   Provides graphical display of current Error Reading in kHz. Positive or negative value is displayed.

Pressing ZOOM Soft Function Key F1 when cursor is at RF Frequency Error Meter Label (1) accesses full screen RF Frequency Error Meter. Available features and editable fields are as follows:W



5. RF

Displays selected RF Receiver Frequency. Selections range from .0000 to 1000 MHz.

6. IF Bandwidth

Displays selected IF Bandwidth. Selections include 15 and 300 kHz.

Soft Function Keys available with this function include:

F1 300 kHz
Selects 300 kHz bandpass filter as active filter.

F2 15 kHz
Selects 15 kHz bandpass filter as active filter.

7. Range

Displays selected RF Frequency Error Meter Upper Range. Selections include Autorange, 100 Hz, 1 kHz, 10 kHz and 100 kHz.

Soft Function Keys available with this function include:

F1 100 Hz
Selects 100 Hz Range.

F2 1 kHz
Selects 1 kHz Range.

F3 10 kHz
Selects 10 kHz Range.

F4 100 kHz
Selects 100 kHz Range.

F5 AUTO
Selects Autorange.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

8. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. Remains OFF in Autorange. When ON, Peak Readings (13) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

9. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages selected number of readings and reports average as Digital Readout (17). Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

10. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0 to 100000 Hz. When ON, Upper Limit Bars (16) are displayed for below and above RF (5).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

11. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (10).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

12. Gate Time

Displays selected Gate Time for acquiring signal frequency. Selections include 0.1 and 1.0 seconds. Selecting 0.1 second Gate Time allows faster acquisition of data and is less accurate than 1.0 second Gate Time.

F1 0.1 S
Selects 0.1 second Gate Time.

F2 1.0 S
Selects 1.0 second Gate Time.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

13. Peak Readings

Displays current high and low Peak readings when Peak Hold (8) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

14. Upper Range Limit Readout

Displays current value of Range (7). Redefined as needed if Autorange function is active.

15. Bar Meter

Relative Graphic display of current Meter reading.

16. Upper Limit Bar

Indicates position of Upper Limit (10) on Bar Meter (15). If Upper Limit (10) exceeds Range (7), marker is not visible.

17. Frequency Reading

Displays current Frequency of received signal in MHz.

18. Error Reading

Displays current Frequency Error of transmitter in kHz. Frequency Error is difference between transmitted frequency and frequency for which COM-120B is set to receive. Frequency Error is positive or negative value.

19. SCOPE/ANALYZER Screen

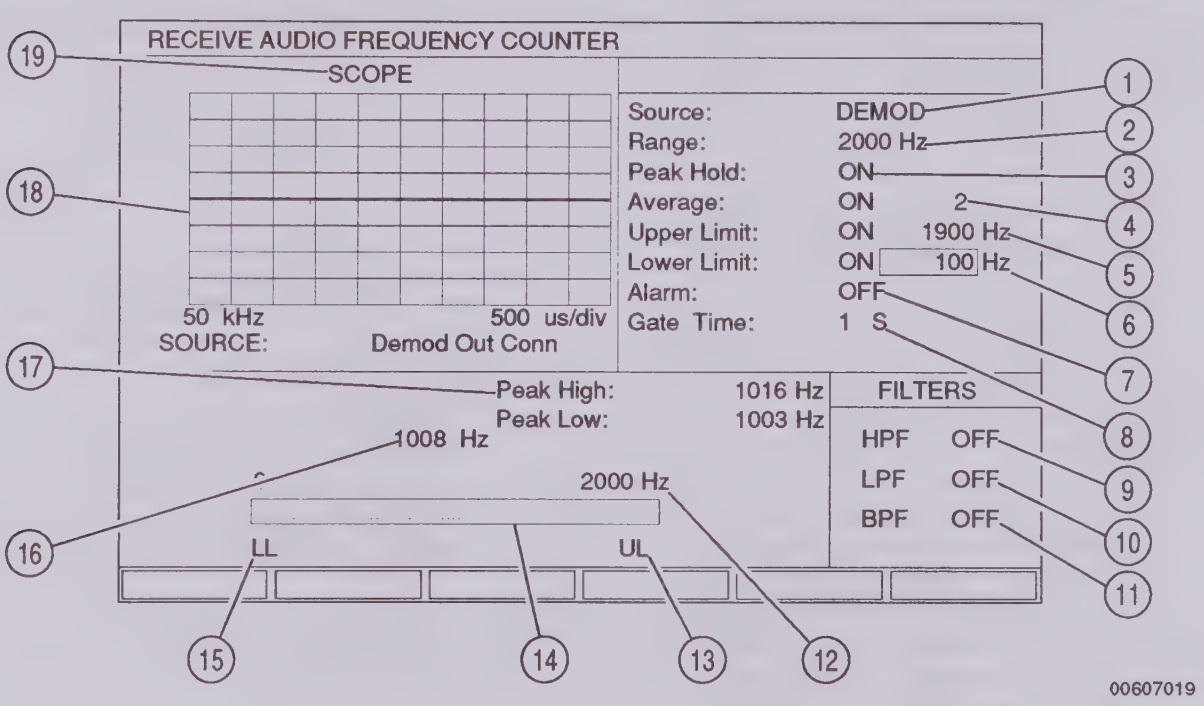
Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

20. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions.

L. AUDIO FREQUENCY COUNTER

The Audio Frequency Counter for the RF Receive Operation Screen counts the audio signal that is modulating the received RF signal. The Audio Frequency Counter is visible as reading only on the RF Receive Operation Screen or a full screen meter. Information provided from the full meter is displayed below:



1. Source

Displays DEMOD (Demodulated Signal) as Meter Source. Field is for display only.

2. Range

Displays selected RF Power Meter Upper Range. Selections include Autorange, 200 Hz, 2000 Hz and 20 kHz.

Soft Function Keys available with this function include:

F1 200 Hz
Selects 200 Hz Range.

F2 2000 Hz
Selects 2 kHz Range.

F3 20 kHz
Selects 20 kHz Range.

F4 AUTO
Selects Autorange.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

3. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. Remains OFF in Autorange. When ON, Peak Readings (17) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

4. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages selected number of readings and reports average as Digital Readout (17). Range of samples is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

5. Upper Limit

Displays status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0 to 20000 Hz. When ON, Upper Limit Bar (13) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

6. Lower Limit

Displays status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range is 0 to 20000 Hz. When ON, Lower Limit Bar (16) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

7. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (5) or goes below Lower Limit (6).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

8. Gate Time

Displays selected Gate Time for acquiring signal frequency. Selections include 1 and 10 seconds. Selecting 1 second Gate Time allows faster acquisition of data but is less accurate than 10 second Gate Time.

F1 1 S
Selects 1 second Gate Time.

F2 10 S
Selects 10 second Gate Time.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

9. High-Pass Filter (HPF)

Displays current High-Pass Filter setting for Audio Frequency Counter.

10. Low-Pass Filter (LPF)

Displays current Low-Pass Filter setting for Audio Frequency Counter.

11. Bandpass Filter (BPF)

Displays current Bandpass Filter setting for Audio Frequency Counter.

12. Upper Range Limit Readout

Displays current value of Range (2). Redefined as needed if Autorange function is active.

13. Upper Limit Bar

Indicates position of Upper Limit (5) on Bar Meter (14). If Upper Limit (5) exceeds Range (2), marker is not visible.

14. Bar Meter

Relative Graphic display of current Meter reading.

15. Upper Limit Bar

Indicates position of Lower Limit (6) on Bar Meter (14). If Upper Limit (10) exceeds Range (2), marker is not visible.

16. Frequency Reading

Displays current Audio Frequency of demodulated signal in kHz.

17. Peak Readings

Displays current high and low Peak readings when Peak Hold (8) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

18. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

19. SCOPE/ANALYZER Prompt

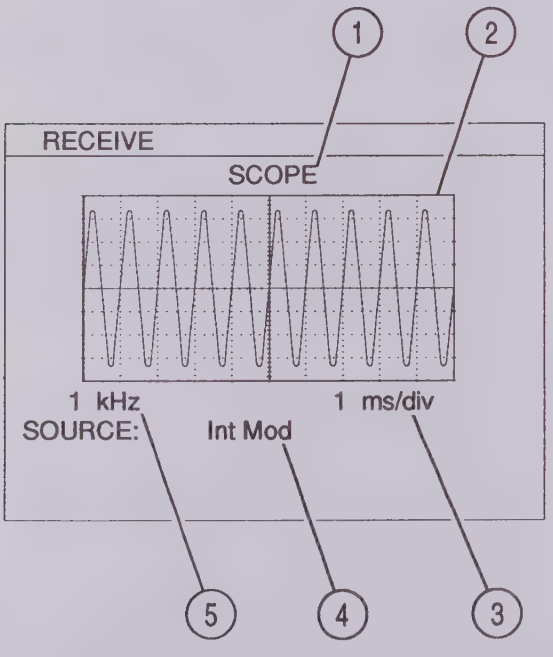
Displays current operation function. Used to toggle between two functions.

M. OSCILLOSCOPE OPERATION SCREEN

The abbreviated Oscilloscope, as follows, is visible from the RF Receive Operation Screen and the following full-size Meter Operation Screens:

SINAD Meter
Distortion Meter
FM Deviation Meter
AM Modulation Meter
Phase Modulation Meter
RF Power Meter
Receive Level Meter
RF Frequency Error Meter
Audio Frequency Counter

An abbreviated Spectrum Analyzer is available in the same position. All set parameters are reflected in all of the above Operation Screens. Features and parameters of the abbreviated Oscilloscope are as shown:



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1. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions.

Soft Function Keys are available on RF Receive Operation Screen only:

F1 ZOOM
Accesses expanded version of active function.

F2 ANALY/SCOPE
Accesses inactive function. If SCOPE is active, displays ANALY. If ANALYZER is active, displays SCOPE.

2. Oscilloscope Screen

Displays digitized trace of specified signal.

3. Sweep

Displays selected Oscilloscope Sweep. Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Sweep. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu to RF Receive Operation Screen.

F2 ROLL
Views the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.

F2 SLOW
Returns to the normal mode of operation.

4. SCOPE SOURCE

Displays selected Oscilloscope Source. Selections include:

SOURCE	Signal Input	Signal Type
Scope/DVM-GND	Scope/DVM Connector	External Ground-Coupled Signal
Scope/DVM-AC	Scope/DVM Connector	External AC-Coupled Signal
Scope/DVM-DC	Scope/DVM Connector	External DC-Coupled Signal
AF Cntr	Audio Frequency Counter Signal	Demodulated Signal passed through filters to Audio Frequency Counter.
Notch Residual	Internal Filtered Signal	Notch Filtered Signal passed to SINAD and Distortion Meters. Reading is relative with no units applied.
Audio/Data/Gen Out	Audio/Data GEN Connector	Composite signal of Audio/Data Generators
DTMF/SINAD	Signal applied to Audio Frequency Decoder, SINAD and Distortion Meters	Demodulated Signal passed through filters to Audio Frequency Decoder, SINAD and Distortion Meters
Data Decoder	Signal applied to Data Decoder	Demodulated Signal passed through filters to Data Decoder
RF Power	RF Power Meter Input	Relative to detected signal applied to RF Power Meter
Detector Out	Demodulated Audio	Unfiltered Demodulated Signal
Demod Out Connector	DEMOD Connector	Filtered Demodulated Signal applied to DEMOD Connector
Mod Meters	Modulation Meters source	Filtered Demodulated Signal applied to selected Modulation Meter.

Soft Function Keys available with this function include:

F1 MENU
Accesses MENU to set active Oscilloscope Source. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into normal operation without changing Source.

5. Oscilloscope Scale

Displays selected Oscilloscope Vertical Scale. Selections available differ with different SCOPE SOURCE (4). Scales are as follows:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
AF Cntr	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data/Gen Out	20, 40, 100, 200, 400 mV 1 V
DTMF/SINAD	FM DEMOD TYPES: ≤20 kHz 0.1, 0.2, 0.5, 1, 2, 5 kHz ≥20 kHz 0.2, 0.4, 1, 2, 4, 10 kHz 50 kHz 0.5, 1, 2.5, 5, 10, 25 kHz 100 kHz 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE: 20% PM DEMOD TYPE Radians 0.1, 0.2, 0.5, 1, 2, 5
Data Decoder	FM DEMOD TYPES: ≤20 kHz 0.1, 0.2, 0.5, 1, 2, 5 kHz ≥20 kHz 0.2, 0.4, 1, 2, 4, 10 kHz 50 kHz 0.5, 1, 2.5, 5, 10, 25 kHz 100 kHz 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE: 20% PM DEMOD TYPE Radians 0.1, 0.2, 0.5, 1, 2, 5
RF Power	Low, Med, High (Selection is automatic depending on power provided T/R Connector)
Detector Out	FM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
Demod Out Connector	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Mod Meters	FM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians

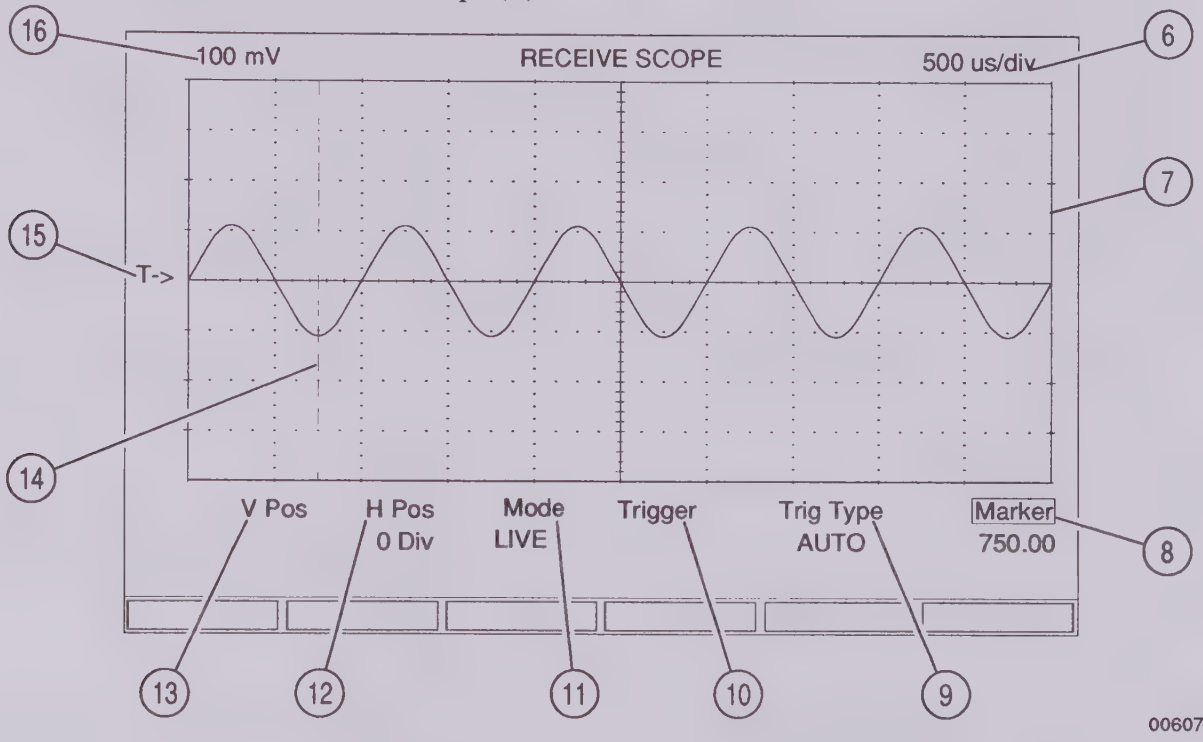
Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Scale. Selections available are dependent on selected Source (4). Refer to previous table for selections available. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu to RF Receive Operation Screen.

Pressing ZOOM Soft Function Key F1 accesses full screen Oscilloscope, when cursor is on SCOPE/ANALYZER Prompt (1).

Available features and parameters are as follows:



6. Sweep

Displays selected Oscilloscope Sweep. Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Sweep.

F6 RETURN
Exits Menu into normal operation.

F2 ROLL
Views the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.

F2 SLOW
Returns to the normal mode of operation.

7. Oscilloscope Screen

Displays digitized trace of specified signal.

8. Marker Position

Displays Marker Position if Marker (14) is active or OFF if inactive. Value for Marker Position is in same units as Sweep (6) with Trigger Level (15) as reference.

Soft Function Keys available with this function include:

F1 On/Off
Toggles Marker (14) between On and Off

9. Trigger Type

Displays Trigger Type. Selections include Auto, One Shot and Normalized.

Soft Function Keys available with this function include:

F1 NORM
Selects Normalized Trigger Type.

F2 AUTO
Selects Auto as Trigger Type.

F3 1 SHOT
Selects One Shot as Trigger Type. Pressing 1 Shot Soft Function Key reenables Trigger.

10. Trigger

Adjusts trigger level as indicated by Trigger Level Indicator (15) when accessed.

11. Mode

Displays Operation Mode. Selections include Live, Compare, Recall, Store and Average.

Soft Function Keys available with this function include:

F2 LIVE
Selects LIVE as Oscilloscope Operation Mode.

F3 AVG
Selects Average as Oscilloscope Operation Mode.

F4 COMPARE
Selects COMPARE as Oscilloscope Operation Mode.

F5 RECALL
Selects RECALL as Oscilloscope Operation Mode.

F6 STORE
Selects STORE as Oscilloscope Operation Mode.

12. H Pos

Displays selected horizontal offset in major divisions. Selections range from -10 to +10 Divisions.

13. V Pos

Accesses vertical position of trace.

14. Marker

User editable Marker controlled using Marker Position (8). Movable through extent of visible screen.

15. Trigger Level Indicator

Indicates approximate Oscilloscope Trigger Level. Editable using Trigger (10).

16. Oscilloscope Scale

Displays Oscilloscope Vertical Scale. Selections available differ with different Source. Scales for each SCOPE SOURCE (4) are as follows:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
AF Cntr	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data/Gen Out	20, 40, 100, 200, 400 mV 1 V
DTMF/SINAD	FM DEMOD TYPES: ≤20 kHz 0.1, 0.2, 0.5, 1, 2, 5 kHz ≥20 kHz 0.2, 0.4, 1, 2, 4, 10 kHz 50 kHz 0.5, 1, 2.5, 5, 10, 25 kHz 100 kHz 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE: 20% PM DEMOD TYPE Radians 0.1, 0.2, 0.5, 1, 2, 5
Data Decoder	FM DEMOD TYPES: ≤20 kHz 0.1, 0.2, 0.5, 1, 2, 5 kHz ≥20 kHz 0.2, 0.4, 1, 2, 4, 10 kHz 50 kHz 0.5, 1, 2.5, 5, 10, 25 kHz 100 kHz 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE: 20% PM DEMOD TYPE Radians 0.1, 0.2, 0.5, 1, 2, 5

SCOPE SOURCE (4)	Available Scales
RF Power	Low, Med, High (Selection is automatic depending on power provided T/R Connector)
Detector Out	FM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
Demod Out Connector	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Mod Meters	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Scale. Soft Function Keys available with this function include:

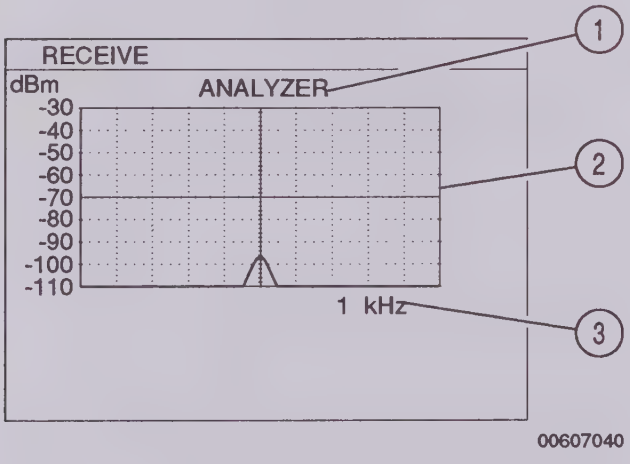
F6 RETURN
Exits Menu to RF Receive Operation Screen.

N. SPECTRUM ANALYZER OPERATION SCREEN

The abbreviated Spectrum Analyzer, as follows, is visible from the RF Receive Operation Screen and the following full-size Meter Operation Screens:

SINAD Meter
Distortion Meter
FM Deviation Meter
AM Modulation Meter
Phase Modulation Meter
RF Power Meter
Receive Level Meter
RF Frequency Error Meter
Audio Frequency Counter

An abbreviated Oscilloscope is available in the same position. All set parameters are reflected in all of the above Operation Screens. Features and parameters of the abbreviated Spectrum Analyzer are as shown:



1. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions.

Soft Function Keys available with this field include:

F1 ZOOM
Accesses expanded version of active function.

F2 ANALY/SCOPE
Accesses inactive function. If SCOPE is active, displays ANALY. If ANALYZER is active, displays SCOPE.

2. Spectrum Analyzer Screen

Displays digitized trace of specified signal.

3. Scan Width

Displays selected Scan Width per division. Selections include zero scan and:

1 kHz	50 kHz	2 kHz
100 kHz	5 kHz	200 kHz
10 kHz	500 kHz	20 kHz
1 MHz		

Soft Function Keys available with this function include:

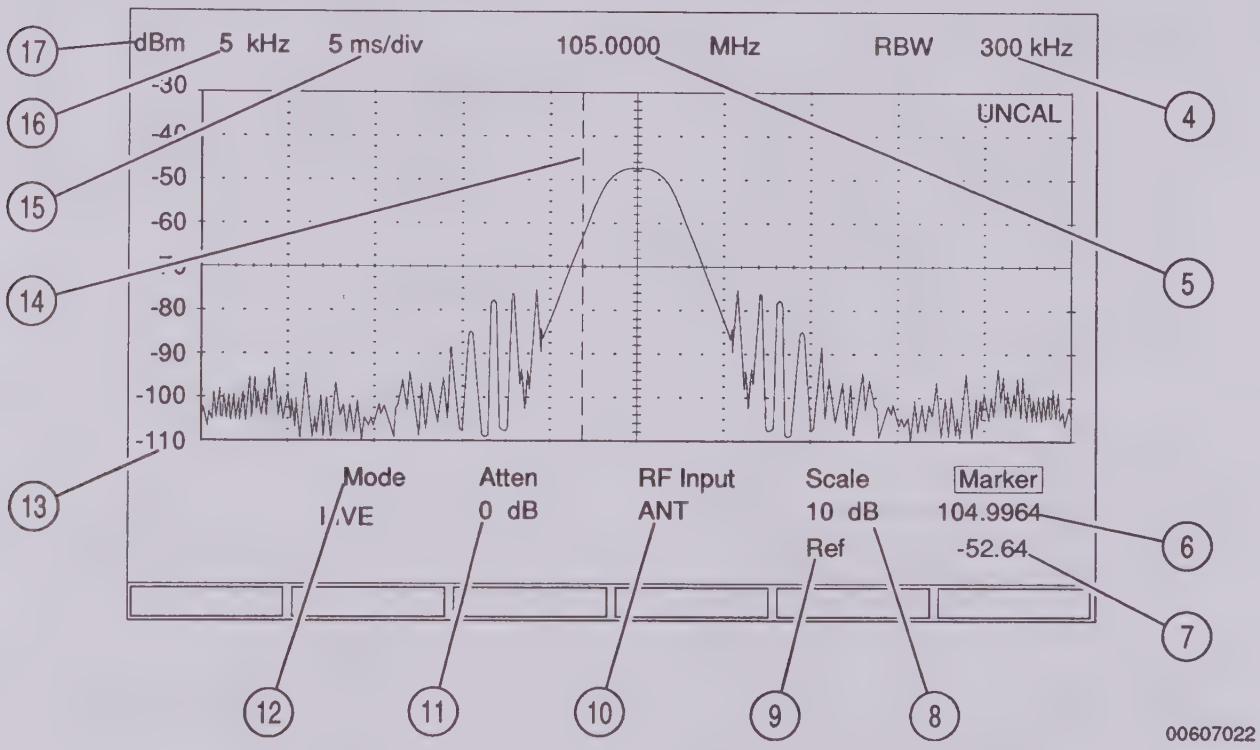
F1 MENU
Accesses Menu to set Scan Width. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into normal operation.

F2 CONFIG
Accesses a pop up screen to configure Scan width, RBW (Resolution Bandwidth) and Sweep rate.

Pressing ZOOM Soft Function Key F1 accesses full screen Spectrum Analyzer, when cursor is on SCOPE/ANALYZER

Prompt (1) and abbreviated Spectrum Analyzer is displayed. Available features and parameters are described as follows:



4. Resolution Bandwidth

Displays Resolution Bandwidth for selected Scan Width (15). This field is editable. The word "UNCAL" appears in the display when combinations of RBW, frequency span and sweep rate for which the analyzer is not calibrated are used. Available RBW selections include:

300 Hz	3 kHz	30 kHz
300 kHz	3 MHz	

Soft Function Keys available with this function include:

F1 MENU
Accesses a Menu with RBW selections.

F6 RETURN
Exits Menu into normal operation.

F5 DEFLT
Sets only the current field to factory default.

F6 COUPLE
Sets the sweep and RBW to factory default state for the current scan width.

5. Center Frequency

Displays Center Frequency. Selections range from 0.0000 to 1000.0000 MHz. For Scan Widths ≥2 MHz/div, start and stop frequencies must be above 0 MHz and below 1000 MHz.

F1 Set Ref
Adjusts Spectrum Analyzer to referenced level. Function should be initiated when frequency is changed for greatest accuracy.

F2 Find
Activates Find Function. Find Function searches for first signal with level exceeding reference set by Find Lvl Soft Function Key F3. Search band is twice Sweep Width, set by Config Soft Function Key F4, centered around Center Frequency.

F3 Find Lvl
Activates horizontal marker for setting reference level of Find Function. Marker level is controlled by DATA SCROLL Keys or DATA SCROLL Spinner. Press Soft Key to exit.

F4 Config
Accesses window for setting Sweep Width for Find Function. Range of Sweep Width is 0.2000 to 500.0000 MHz. Press Soft Key to exit.

F5 Split
Accesses Split Screen Function. Split Screen Spectrum Analyzer allows two Center Frequencies. Soft Function Keys include:

F1 Normal
Sets Spectrum Analyzer to Normal Center Frequency Operation.

6. Marker Position

Displays current Marker Position if Marker (12) is active or OFF if inactive.

Soft Function Keys available with this function include:

F1 On/Off
Toggles Marker (12) between On and Off.

7. Marker Level

Displays current Marker Level if Marker (12) is active. Blank if Marker (12) is OFF.

8. Scale

Displays Logarithmic Scale for Vertical Scale (13). Selections are 2 and 10 dB.

F1 10 dB
Selects 10 dB Logarithmic Scale for Spectrum Analyzer Vertical Scale (13).

F2 2 dB
Selects 2 dB Logarithmic Scale for Spectrum Analyzer Vertical Scale (13).

9. Reference

Adjusts Spectrum Analyzer Vertical Scale (13) for 10 dB when Scale (8) is set to 10 dB. When Scale (8) is set to 2 dB, adjusts Spectrum Analyzer Vertical Scale (13) through full range, displaying 16 dB window and incrementing in 1 dB steps.

10. RF Input

Displays selected RF Input Connector. Selections include ANT (ANTENNA Connector) and T/R (T/R Connector).

Soft Function Keys available with this function include:

F1 T/R
Selects T/R Connector as RF Input Connector.

F2 ANT
Selects ANTENNA Connector as RF Input Connector.

11. Atten

Displays Attenuation for RF Input (10). Selections include 0 dB and 30 dB.

Soft Function Keys available with this function include:

F1 30 dB
Selects 30 dB Attenuation for RF Input (10).

F2 0 dB
Selects 0 dB Attenuation for RF Input (10).

12. Mode

Displays selected Operation Mode. Selections include Peak Hold, Live, Compare, Recall, Store, Average and Normalized.

Soft Function Keys available with this function include:

F1 PKHOLD
Selects Peak Hold as Spectrum Analyzer Operation Mode.

F2 LIVE
Selects LIVE as Spectrum Analyzer Operation Mode.

F3 AVG
Selects Average as Spectrum Analyzer Operation Mode.

F4 COMPARE
Selects COMPARE as Spectrum Analyzer Operation Mode.

F5 RECALL
Selects RECALL as Spectrum Analyzer Operation Mode.

F6 STORE
Selects STORE as Spectrum Analyzer Operation Mode.

13. Vertical Scale

Provides scale for Spectrum Analyzer. Position is controlled by Reference (9).

14. Marker

User editable Marker controlled using Marker Position (8).

15. Zero Scan Sweep

Displays selected Sweep per division when Scan Width (16) is set to Zero Scan. Selections include:

200 µs/div	500 µs/div	1 ms/div
2 ms/div	5 ms/div	10 ms/div
20 ms/div	50 ms/div	100 ms/div
200 ms/div	500 ms/div	

16. Scan Width

Displays selected Scan Width per division. Selections include zero scan and:

1 kHz	50 kHz	2 kHz
100 kHz	5 kHz	200 kHz
10 kHz	500 kHz	20 kHz
1 MHz	2 MHz	5 MHz
10 MHz	20 MHz	50 MHz
100 MHz		

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Scan Width. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into normal operation.

F6 COUPLE
Sets the sweep and RBW to factory default state for the current scan width.

17. Logarithmic Function

Displays selected Logarithmic Function for referencing Vertical Scale (13). Selections include dBm, dBµV, dBmV, dBV, dBµW and dBW.

Soft Function Keys available with this function include:

F1 dBm
Selects dBm as Logarithmic Function.

F2 dBµV
Selects dBµV as Logarithmic Function.

F3 dBmV
Selects dBmV as Logarithmic Function.

F4 dBV
Selects dBV as Logarithmic Function.

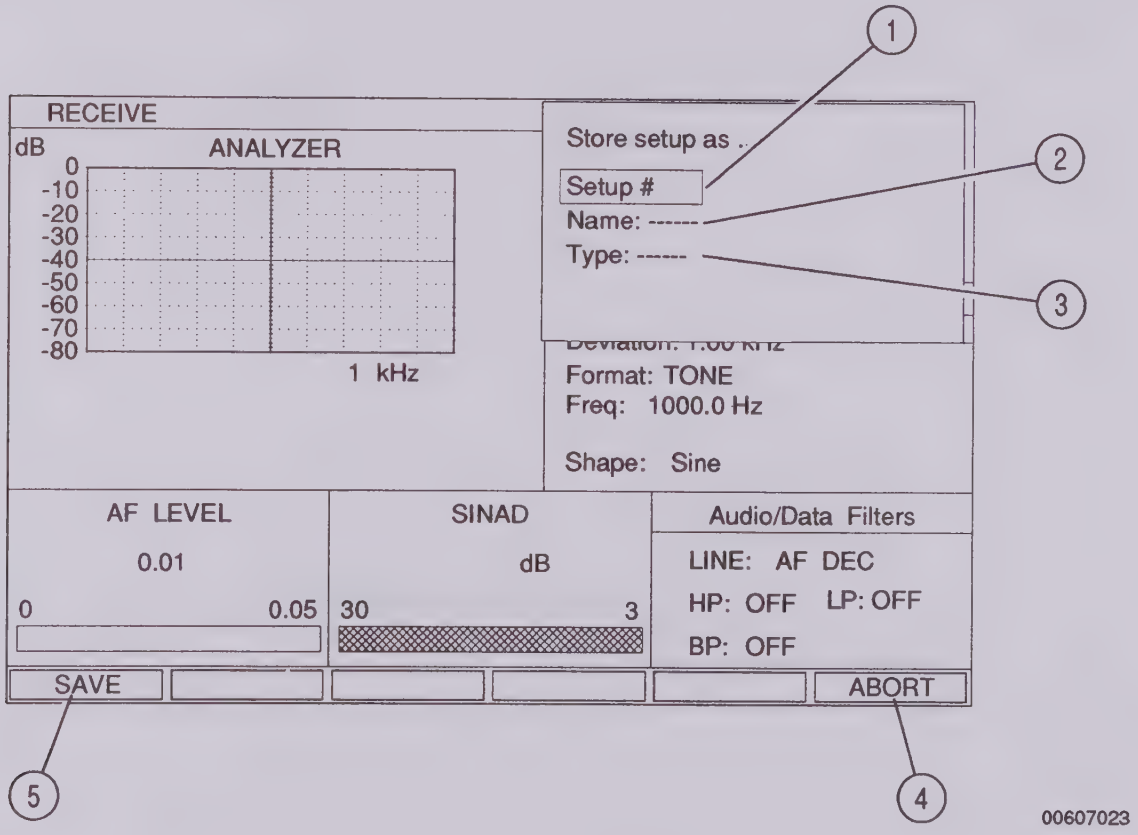
F3 dBµW
Selects dBµW as Logarithmic Function.

F4 dBW
Selects dBW as Logarithmic Function.

O. STORE AND RECALL OPERATION

Pressing STORE Memory Key allows the operator to store up to 50 RF Receive Operation Screen configurations. Storage Locations 0 through 49 can be used to store a RF Generate Operation configuration, a RF Receive Operation configuration or a Duplex Operation configuration (Receive and Generate pair).

Pressing STORE Memory Key while in RF Receive Operation Screen accesses the following fields:



1. Setup #

   Displays selected Memory Location for storage of current configuration.

2. Name

   Displays optional alphanumeric label for selected Memory Location.

3. Type

   Displays the type of data saved in the specified setup number. Available types to save and recall are: DUPLEX, GENERATOR, RECEIVER and EMPTY.

4. ABORT Soft Function Key F6

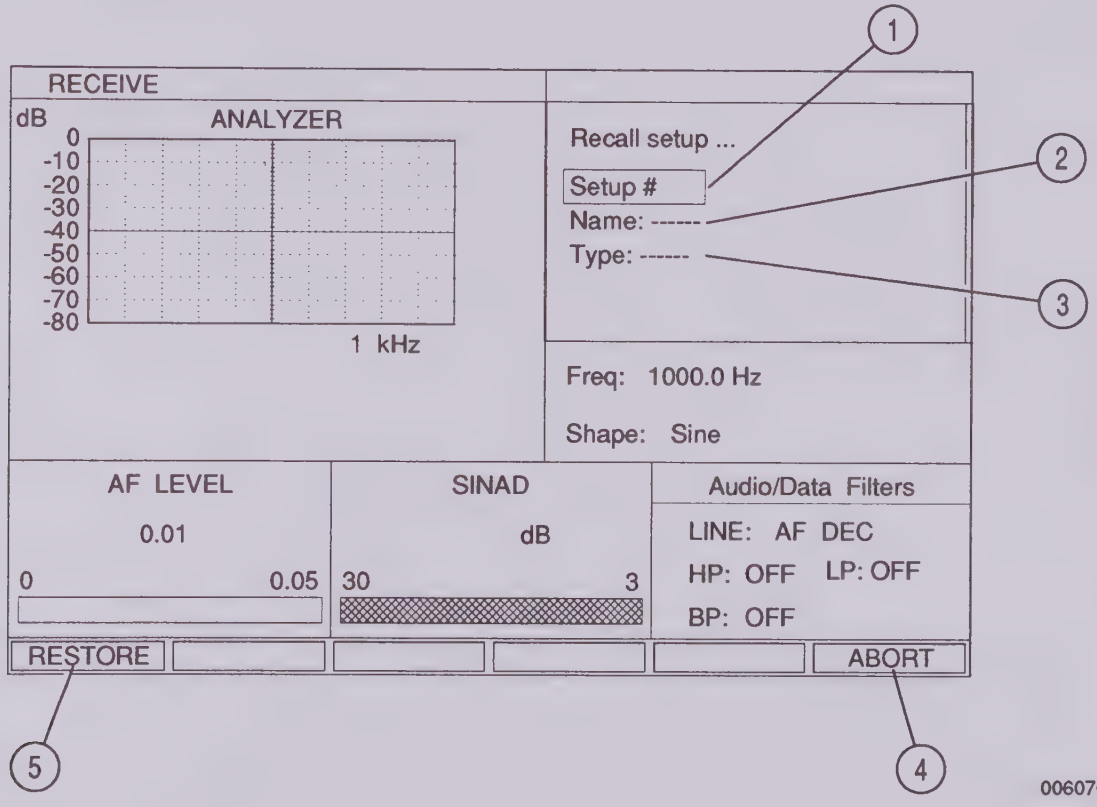
Escapes Storage Operation without performing edit. SAVE Soft Function Key F1 (5) or ABORT Soft Function Key F6 must be pressed to return to normal operation.

5. SAVE Soft Function Key F1

Finalizes Storage Operation. SAVE Soft Function Key F1 or ABORT Soft Function Key F6 (4) must be pressed to return to normal operation.

Pressing RCL Memory Key allows the operator to recall up to 50 previously stored operation screens. RF Receive, RF Generate or Dupex Operation Screen configurations and all be accessed from the RF Generate Operation Screen. Accessing anything other than an RF Generate Operation Screen configuration, automatically switches the COM-120B to the selected mode of operation.

Pressing RCL Memory Key while in RF Receive Operation Screen accesses the following fields:



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1. Setup #

   Displays selected Memory Location for recall of stored configuration.

2. Name

   Displays optional alphanumeric label for selected}emory Location.

3. Type

   Displays the type of data saved in the specified setup number. Available types to save and recall are: DUPLEX, GENERATOR, RECEIVER and EMPTY.

4. ABORT Soft Function Key F6

Escapes Storage Operation without performing edit. RESTORE Soft Function Key F1 (5) or ABORT Soft Function Key F6 must be pressed to return to normal operation.

5. RESTORE Soft Function Key F1

Finalizes Recall Operation. RESTORE Soft Function Key F1 or ABORT Soft Function Key F6 (4) must be pressed to return to normal operation.

3-3-3 DUPLEX OPERATION SCREEN

The Duplex Operation Screen is used to define and activate the COM-120B RF Generator and RF Receiver simultaneously at the same frequency or offset frequencies. The Duplex Operation Screen is accessed by pressing the DPLX Test Mode Key. When accessed, the Duplex Operation Screen is setup in the configuration in which it was last used.

Because of the level of detail required to fully describe the Duplex Operation Screen, information is split by function into sections. The first section covers the overall screen and refers the operator to other sections for additional information.

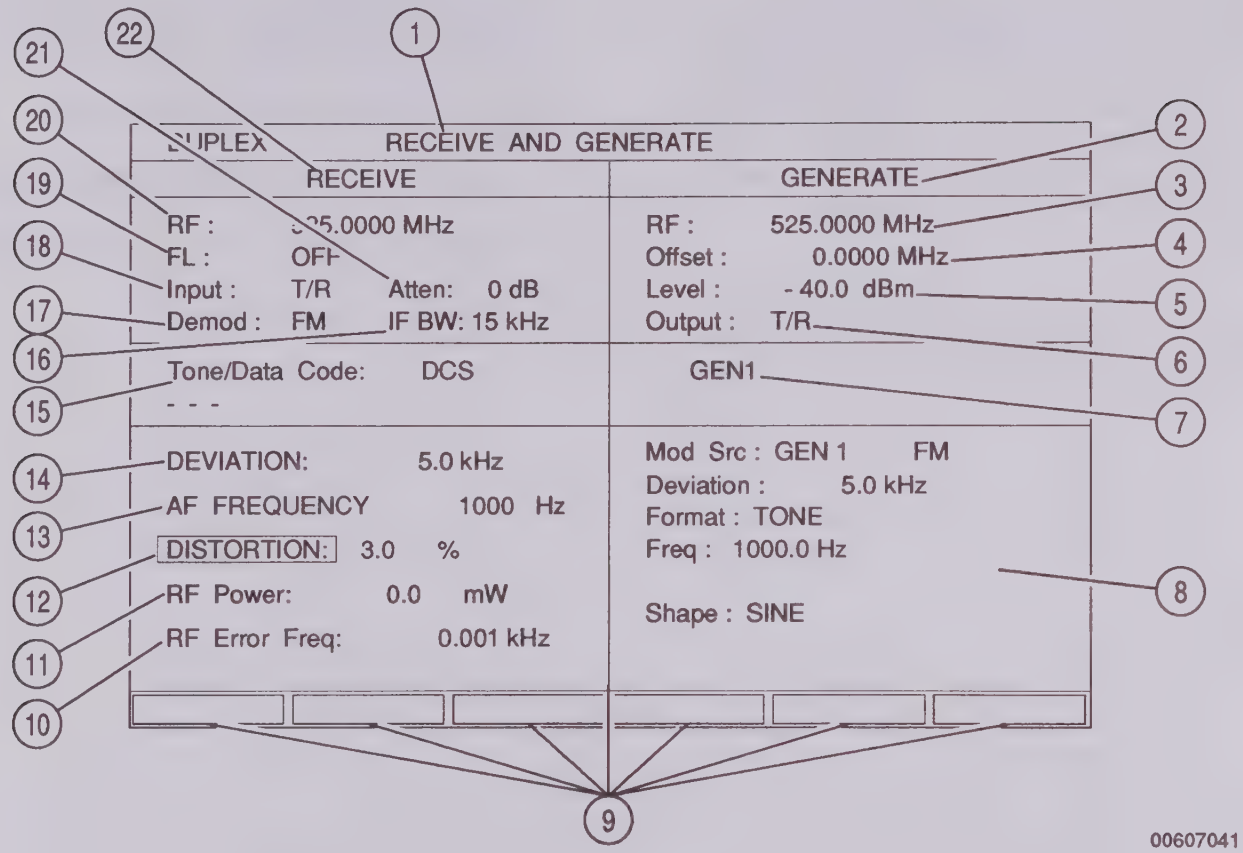
A. Duplex General Operation Screen

B. Duplex Generate General Operation Screen

C. Duplex Receive General Operation Screen

D. Store and Recall Operation

A. DUPLEX GENERAL OPERATION SCREEN



Duplex Operation Screen

1. Header Bar

Displays current operation mode.

2. Duplex Generate Prompt

Accesses Duplex Generate Operation Screen.

Soft Function Keys available with this function include:

F1 ZOOM
Accesses Duplex Generate Operation Screen.

3. Duplex Generate RF Field

Displays current Duplex Generate Frequency from 0.0000 to 1000.0000 MHz.

Soft Function Keys available with this function include:

F1 Δ=
Accesses window to set Duplex Generate RF Field change increment. With Δ= active, Soft Function Keys are defined as follows:

F6 RETURN
Closes window and returns to normal operation.

F2 Δ On/Off
Toggles Δ Function OFF and ON. If Δ Function is active,"Δ" is displayed by Frequency Readout.

F3 SET REF
Makes frequency in current Duplex Generate RF Field reference frequency. Duplex Generate RF Field displays offset from reference frequency when activated. If Set Reference Function is active, "R" is displayed.

F5 PAIR/UNPAIR
Toggles PAIR Function ON and OFF. With function active, UNPAIR is displayed for Soft Function Key field and "P" is displayed next to Duplex Generate RF Field. Function ties Duplex Generate RF Field (3) and Duplex Receive RF Field (20) together as Pair with specified Frequency Offset (4). With Pair Function active, editing Duplex Generate RF Field changes Duplex Receive RF Field (20). Editing Frequency Offset (4) or Duplex Receive RF Field (20) changes Duplex Generate RF Field.

4. Frequency Offset

Displays frequency difference between Duplex Generate RF Field (3) and Duplex Receive RF Field (20). Range is from -999.7500 to 999.750 MHz.

F5 PAIR/UNPAIR
Toggles PAIR Function ON and OFF. With function active, UNPAIR is displayed for Soft Function Key field and "P" is displayed next to Duplex Generate RF Field. Function ties Duplex Generate RF Field (3) and Duplex Receive RF Field (20) together as Pair with specified Frequency Offset. With Pair Function active, editing Duplex Generate RF Field (3) changes Duplex Receive RF Field (20). Editing Frequency Offset (4) or Duplex Receive RF Field (20) changes Duplex Generate RF Field.

5. Output Level

Displays Output Level. If T/R Connector is selected for Output (6), range is -130 to -40 dBm, 0 to .002236 V, 0 to 2.2360 mV or 0.07 to 2236.0 μV. If AUX RF Connector is selected for Output (6), range is -130 to -13 dBm, 0 to 0.050059 V, 0 to 50.0593 mV or 0.07 to 50059.3 μV.

Soft Function Keys available with this function include:

F1 dBm
Selects units of dBm for Output Level.

F2 μV
Selects units of μV for Output Level.

F3 mV
Selects units of mV for Output Level.

F4 V
Selects units of mV for Output Level.

6. Output

Displays Output Connector. Displays T/R, T/R Gate, AUX or AUX Gate. Gated Output is active only when microphone, attached to MIC/ACC Connector, is keyed.

Soft Function Keys available with this function include:

F1 T/R
Selects T/R Connector as output connector.

F2 AUX
Selects AUX RF OUT Connector as output connector.

F3 T/R Gate
Selects T/R Connector as output connector. Output is only active when microphone, attached to MIC/ACC Connector, is keyed.

F4 AUX Gate
Selects AUX RF OUT Connector as output connector. Output is only active when microphone, attached to MIC/ACC Connector, is keyed.

7. Modulation Source Window

Displays active Modulation Sources. Inactive Modulation Sources are not shown. If two (or more) sections of the RF Modulator are set in conflict (e.g. GEN1 set for PM and GEN2 set for FM, or GEN1 set for 0.01 kHz deviation and GEN2 set for 2.60 kHz deviation) the screen displays the invalid source grayed out.

8. Modulation Source Block

Displays selected Modulation Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator), DATA (DATA Generator), EXT (External Modulation) and MIC (Microphone Modulation).

9. Soft Function Key Definitions

Functions are redefined with each field of the current operation screen.

10. RF Error Frequency

Displays difference in Duplex Receive RF Field (20) and received signal frequency.

11. Power/Received Level Reading

Power Meter displays power level of signal received through T/R Connector in W. RECEIVED LEVEL Meter displays referenced Power Level of signal received through ANTENNA Connectorn in dBm.

12. SINAD/Distortion Reading

Displays selected measurement. Selections include SINAD or Distortion Readings.

Soft Function Keys available with this function include:

F2 SINAD
Selects SINAD Reading as active reading. Not displayed if reading is currently active.

F3 DIST
Selects Distortion Reading as active reading. Not displayed if reading is currently active.

13. AF FREQUENCY Reading

Displays Audio Frequency of demodulated signal.

14. MODULATION Reading

Displays modulation reading in units of selected Demodulation Type (17). With FM selected, Field displays DEVIATION and has reading in units of kHz. With AM selected, Field displays MODULATION and has reading in units of % Modulation. With PM selected, Field displays PHASE and has reading in units of radians.

15. TONE/DATA CODE Field

Displays selected Tone/Data Type and decoded data. Selections for Tone/Data Type available with standard COM-120B include:

DCS DTMF USER
DCS INV (DCS Inverted)

Additional selections are shown but are unusable unless Option 09 or Option 11 is installed. Additional selections available include:

CCIR CCIRH CCIRH4
EEA EIA NATEL
ZVEI DZVEI DDZVEI
EURO 5/6 TONE POGSAG
POCSAG/ (POCSAG Inverted)

Soft Function Keys available with this function include:

F1 MENU
Displays TONE/DATA Type selections. Soft Function Keys available include:

F6 RETURN
Returns COM-120B to normal Duplex Operation.

F2 DECODE
Activates DECODE Function for specified Audio/Data type. Accesses Tone Decode Screen for Signalling formats, POCSAG Decode Screen for POCSAG Decode Function and initiates decoding function for DCS and DCS Inverted Functions.

Soft Function Keys available with USER selected for TONE/DATA Type include:

F3 CONFIG
Accesses Configuration Window for configuring User Selectable Frequency and Duration for codes 0 through 9 and A through T. With Configuration Window active, Soft Function Keys are defined as follows:

F1 PG UP
Used to scroll up through Configuration Window.

F2 PG DN
Used to scroll down through Configuration Window.

F3 FILL
Fills remainder of selected column with value of current cursor position.

F6 RETURN
Exits Configuration Window into normal RF Receive operation.

16. IF BANDWIDTH

Displays selected IF Bandwidth. Selections include 15 and 300 kHz.

Soft Function Keys available with this function include:

F1 300 kHz
Selects 300 kHz bandpass filter as active filter.

F2 15 kHz
Selects 15 kHz bandpass filter as active filter.

17 Demodulation Type

Displays selected Demodulation Type. Selections include FM, AM or PM.

Soft Function Keys available with this function include:

F1 FM
Selects FM Demodulation.

F2 AM
Selects AM Demodulation.

F3 PM
Selects PM Demodulation.

18. Input Connector

Displays connector selected for input. Displays either T/R or ANT.

Soft Function Keys available with this function include:

F1 T/R
Selects T/R Connector as input connector.

F2 ANT
Selects ANTENNA Connector as input connector.

19. FL (Frequency List) Setting

Displays selected Frequency List number (FL-00 through FL-99) when active and OFF when inactive. Duplex Receive RF Field (20) echoes frequency of selected Frequency List setting. Directly editing Duplex Receive RF Field (20) inactivates FL Setting. Displays optional Frequency List Label if used. Blank if unused.

Soft Function Keys available with this function include:

F1 ON/OFF
Toggles active function ON and OFF.

F2 T-Fwd
Accesses Trunking-Forward Channel List.

F3 T-Rvs
Accesses Trunking-Reverse Channel List.

F4 C-Fwd
Accesses Cellular-Forward Channel List.

F5 C-Rvs
Accesses Cellular-Reverse Channel List.

F6 FL
Accesses User Defined Frequency List.

20. Duplex Receive RF Field

Displays current Duplex Receive Frequency from 0.0000 to 1000.0000 MHz.

Soft Function Keys available with this function include:

F1 Δ=
Accesses window to set Duplex Receive RF Field change increment. With Δ= active, Soft Function Keys are defined as follows:

F6 RETURN
Closes window and returns to normal operation.

F2 Δ On/Off
Toggles Δ Function OFF and ON. If Δ Function is active,"Δ" is displayed by Frequency Readout.

F5 PAIR/UNPAIR
Toggles PAIR Function ON and OFF. With function active, UNPAIR is displayed. Function Ties Duplex Generate RF Field (3) and Duplex Receive RF Field together as a Pair with specified Frequency Offset (4). With Pair Function active, editing Duplex Generate RF Field (3) changes Duplex Receive RF Field . Editing Frequency Offset (4) or Duplex Receive RF Field changes Duplex Generate RF Field (3).

21. Attenuation

Displays selected attenuation of input signal. Displays either 0 or 30.

Soft Function Keys available with this function include:

F1 30 dB
Selects 30 dB Attenuation.

F2 0 dB
Selects 0 dB Attenuation.

22. Duplex Receive Prompt

Accesses Duplex Receive Operation Screen.

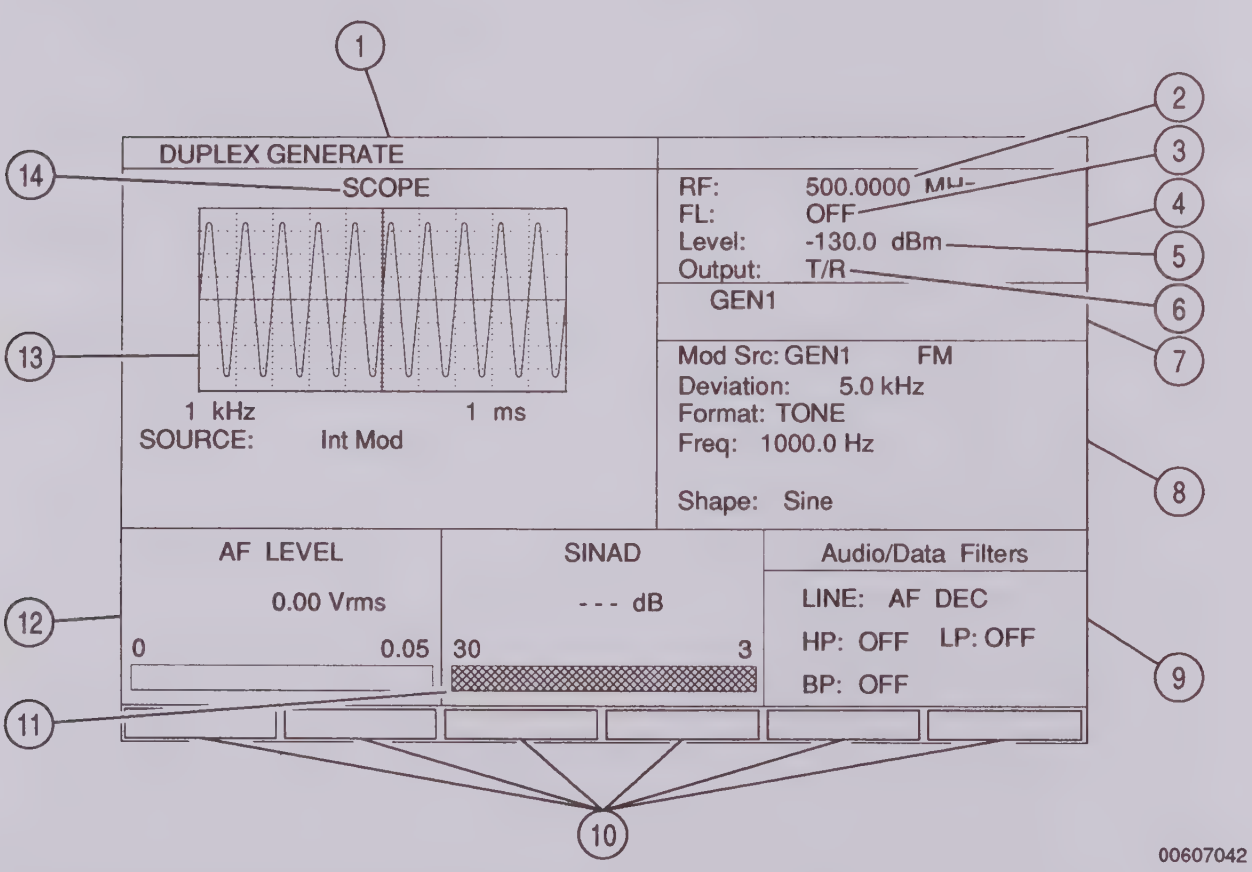
Soft Function Keys available with this function include:

F1 ZOOM
Accesses Duplex Receive Operation Screen.

B. DUPLEX GENERATE GENERAL OPERATION SCREEN

The Duplex Generate Operation Screen is used to define and activate the COM-120B RF Generator for Duplex Operation. The Duplex Generate Operation Screen is accessed by pressing ZOOM Soft Function Key F1 or by pressing ENTER Key while cursor is on the Duplex Generate Prompt on the Duplex Operation Screen.

Features and editable parameters on the Duplex Generate Operation Screen are listed as follows:



Duplex Generate Operation Screen

1. Header Bar

   Displays current operation mode.

2. RF Field

   Displays current Duplex Generate Frequency from 0.0000 to 1000.0000 MHz.

   Soft Function Keys available with this function include:

F1 Δ=
Accesses window to set Duplex Generate RF Field change increment. With Δ= active, Soft Function Keys are defined as follows:

F6 RETURN
Closes window and returns to normal operation.

F2 Δ On/Off
Toggles Δ Function OFF and ON. If Δ Function is active,"Δ" is displayed by Frequency Readout.

F3 SET REF
Makes frequency in current Duplex Generate RF Field reference frequency. Duplex Generate RF Field displays offset from reference frequency when activated. If Set Reference Function is active, "R" is displayed.

F5 PAIR/UNPAIR
Toggles PAIR Function ON and OFF. With function active, UNPAIR is displayed for Soft Function Key field and "P" is displayed next to RF Field. Function ties Duplex Generate RF Field and Duplex Receive Frequency together as Pair with specified Frequency Offset. With Pair Function active, editing Duplex Generate RF Field changes Duplex Receive Frequency.

3. FL (Frequency List) Setting

Displays selected Frequency List number (FL-00 to FL-99) when active. Blank if inactive. RF Field (2) echoes frequency of selected Frequency List setting. Editing RF Field (2) deactivates Frequency List Function.

Soft Function Keys available with this function include:

F1 ON/OFF
Toggles active function ON and OFF.

F2 T-Fwd
Accesses Trunking-Forward Channel List.

F3 T-Rvs
Accesses Trunking-Reverse Channel List.

F4 C-Fwd
Accesses Cellular-Forward Channel List.

F5 C-Rvs
Accesses Cellular-Reverse Channel List.

F6 FL
Accesses User Defined Frequency List.

4. Frequency List Label

Displays optional Frequency List Label if used. Displays Blank if unused.

5. Output Level

Displays Output Level. If T/R Connector is selected for Output (6), range is -130 to -40 dBm, 0 to .002236 V, 0 to 2.2360 mV or 0.07 to 2236.0 µV. If AUX RF Connector is selected for Output (6), range is -130 to -13 dBm, 0 to 0.050059 V, 0 to 50.0593 mV or 0.07 to 50059.3 µV.

Soft Function Keys available with this function include:

F1 **dBm**
Selects units of dBm for Output Level.

F2 μV
Selects units of μV for Output Level.

F3 mV
Selects units of mV for Output Level.

F4 V
Selects units of V for Output Level.

F5 SINAD=
Access field to set SINAD Search Function value.

F6 S=On/Off
Toggles SINAD Search Function ON and OFF. SINAD Search Function changes Output Level to search for SINAD= value from UUT. S= Prompt is displayed with function ON.

6. Output

Displays Output Connector. Displays T/R, T/R Gate, AUX or AUX Gate. Gated Output is active only when microphone attached to MIC/ACC Connector is keyed.

Soft Function Keys available with this function include:

F1 T/R
Selects T/R Connector as output connector.

F2 AUX
Selects AUX RF OUT Connector as output connector.

F3 T/R Gate
Selects T/R Connector as output connector. Output is only active when microphone, attached to MIC/ACC Connector, is keyed.

F4 AUX Gate
Selects AUX RF OUT Connector as output connector. Output is only active when microphone, attached to MIC/ACC Connector, is keyed.

7. Modulation Source Window

Displays active Modulation Sources. Inactive Modulation Sources are not shown. If two (or more) sections of the RF Modulator are set in conflict (e.g. GEN1 set for PM and GEN2 set for FM, or GEN1 set for 0.01 kHz deviation and GEN2 set for 2.60 kHz deviation) the screen displays the invalid source grayed out.

8. Modulation Source Block

Displays Modulation Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator), DATA (DATA Generator), EXT (External Modulation) and MIC (Microphone Modulation).

9. AUDIO/DATA FILTERS Block

Displays current filter information for selected analog signal. Selections include AF Decode Line, Data Decode Line and Speaker/Headphones Line.

10. Soft Function Key Definitions

Functions are redefined with each field of the current operation screen.

11. SINAD/Distortion Meters

Displays selected Meter Operation. Selections include SINAD and Distortion Meters.

Soft Function Keys available with this function include:

F1 ZOOM
Expands current meter into full-size meter.

F2 SINAD
Selects SINAD Meter as active meter. Not displayed if meter is active.

F3 DIST
Selects Distortion Meter as active meter. Not displayed if meter is active.

12. AF LVL METER

Displays AF LEVEL METER Operation.

Soft Function Keys available with this function include:

F1 ZOOM
Expands current meter into full-size meter.

13. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer. Spectrum Analyzer shows Receiver Frequency.

14. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions.

Soft Function Keys available with this function include:

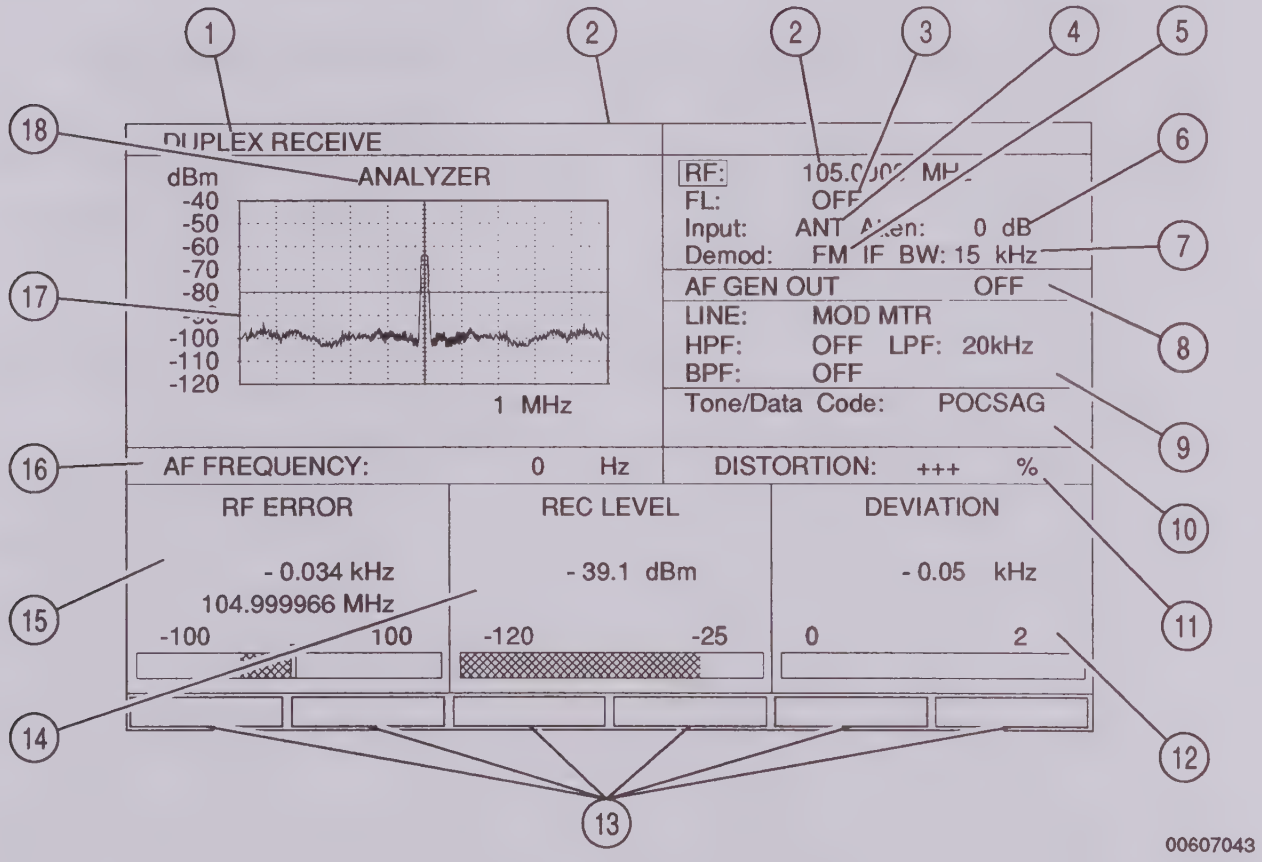
F1 ZOOM
Accesses expanded version of active function.

F2 ANALY/SCOPE
Accesses inactive function. If SCOPE is active, displays ANALY. If ANALYZER is active, displays SCOPE.

C. DUPLEX RECEIVE GENERAL OPERATION SCREEN

The Duplex Receive Operation Screen is used to define and activate the COM-120B RF Receiver for Duplex Operation. The Duplex Receive Operation Screen is accessed by pressing ZOOM Soft Function Key F1 or by pressing ENTER Key when cursor is on the Duplex Receive Prompt on the Duplex Operation Screen.

Features and editable parameters on the Duplex Receive Operation Screen are as follows:



Duplex Receive Operation Screen

1. Header Bar

Displays current operation mode.

2. RF Field

Displays current Duplex Receive Frequency from 0.0000 to 1000.0000 MHz.

Soft Function Keys available with this function include:

F1 Δ=
Accesses window to set Duplex Receive RF Field change increment. With Δ= active, Soft Function Keys are defined as follows:

F6 RETURN
Closes window and returns to normal operation.

F2 Δ On/Off
Toggles Δ Function OFF and ON. If Δ Function is active,"Δ" is displayed by Frequency Readout.

F5 PAIR/UNPAIR
Toggles PAIR Function ON and OFF. With function active, UNPAIR is displayed. Function Ties Duplex Generate Frequency and RF Field together as Pair with specified Frequency Offset. With Pair Function active, editing RF Field changes Duplex Generate Frequency.

3. FL (Frequency List) Setting

Displays selected Frequency List number (FL-00 through FL-99) when active and OFF when inactive. RF Field (2) echoes frequency of selected Frequency List setting. Directly editing RF Field (2) inactivates FL Setting. Displays optional Frequency List Label if used. Blank if unused. If Frequency List Label is used, can be accessed to scroll through all Frequency List entries with common first three characters.

Soft Function Keys available with this function include:

F1 ON/OFF
Toggles active function ON and OFF.

F2 T-Fwd
Accesses Trunking-Forward Channel List.

F3 T-Rvs
Accesses Trunking-Reverse Channel List.

F4 C-Fwd
Accesses Cellular-Forward Channel List.

F5 C-Rvs
Accesses Cellular-Reverse Channel List.

F6 FL
Accesses User Defined Frequency List.

4. INPUT Connector

Displays connector selected for input. Displays either T/R or ANT.

Soft Function Keys available with this function include:

F1 T/R
Selects T/R Connector as input connector.

F2 ANT
Selects ANTENNA Connector as input connector.

5. Demodulation Type

Displays selected Demodulation Type. Selections include FM, AM or PM.

Soft Function Keys available with this function include:

F1 FM
Selects FM Demodulation.

F2 AM
Selects AM Demodulation.

F3 PM
Selects PM Demodulation.

6. Attenuation

Displays selected attenuation of input signal. Displays either 0 or 30.

Soft Function Keys available with this function include:

F1 30 dB
Selects 30 dB Attenuation.

F2 0 dB
Selects 0 dB Attenuation.

7. IF BANDWIDTH

Displays selected IF Bandwidth. Selections include 15 and 300 kHz.

Soft Function Keys available with this function include:

F1 300 kHz
Selects 300 kHz bandpass filter as active filter.

F2 15 kHz
Selects 15 kHz bandpass filter as active filter.

8. AF GEN OUT Field

Pressing ENTER while cursor is on this field accesses setup menu for Audio/Data Generator sources. Menu displays each source individually. Sources available include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator) and DATA (DATA Generator).

Soft Function Keys available with this function include:

F1 ZOOM
Expands window to allow editing of Audio/Data Generators. Soft Function Keys available with this function are:

F1 GEN1
Accesses GEN1 Setup Menu.

F2 GEN2
Accesses GEN2 Setup Menu.

F3 DATA
Accesses DATA Setup Menu.

F4 DTMF
Accesses DTMF Setup Menu.

F6 RETURN
Returns unit to Duplex Receive Operation Screen.

9. AUDIO/DATA FILTERS Block

Displays current filter information for selected analog signal. Selections include Modulation Meters Line, DTMF/SINAD Line, AF Counter Line, Data Decode Line and Speaker/Headphones Line.

10. TONE/DATA CODE Field

Displays selected Tone/Data Type and decoded data. Selections for Tone/Data Type available with standard COM-120B include:

DCS DTMF USER
DCS INV (DCS Inverted)

Additional selections are shown, but are unusable unless Option 09 or Option 11 is installed. Additional selections available include:

CCIR CCIRH CCIRH4
EEA EIA NATEL
ZVEI DZVEI DDZEI
EURO 5/6 TONE POGSAG
POCSAG/ (POCSAG Inverted)

Soft Function Keys available with this function include:

F1 MENU
Displays TONE/DATA Type selections. Soft Function Keys available include:

F6 RETURN
Returns COM-120B to normal RF Receive Operation.

F2 DECODE
Activates DECODE Function for specified Audio/Data type. Accesses Tone Decode Screen for Signalling formats, POCSAG Decode Screen for POCSAG Decode Function and initiates decoding function for DCS and DCS Inverted Functions.

Soft Function Keys available with USER selected for TONE/DATA Type include:

F4 CONFIG
Accesses Configuration Window for configuring User Selectable Frequency and Duration for codes 0 through 9 and A through T. With Configuration Window, active Soft Function Keys are defined as follows:

F1 PG UP
Used to scroll up through Configuration Window.

F2 PG DN
Used to scroll down through Configuration Window.

F3 FILL
Fills remainder of selected column with value of current cursor position.

F6 RETURN
Exits Configuration Window into Duplex Receive operation Screen.

11. DISTORTION/SINAD/MODULATION Reading

Displays distortion reading of received signal if Distortion is selected. Displays SINAD reading of received signal if SINAD is selected. Displays modulation reading in units of selected Demodulation Type (5) if Modulation is selected. This field is interactive with DISTORTION/ SINAD/MODULATION Meter (12). This field displays reading only while DISTORTION/SINAD/ MODULATION Meter (12) displays meter. The same reading cannot be displayed twice. Selection of a specific reading changes source of nonedited field to other source. One source must always be Modulation.

Soft Function Keys available with this function include:

F1 ZOOM
Selects Meter Operation Screen of currently active meter.

F2 SINAD
Selects SINAD reading as active. Blank if SINAD currently active.

F3 DIST
Selects Distortion reading as active. Blank if DIST currently active.

F4 DEV
Selects Modulation reading as active. Blank if DEV currently active. Modulation reading unit type is tied to Demodulation Type (6).

12. DISTORTION/SINAD/MODULATION Meter

Displays distortion reading of received signal if Distortion is selected. Displays SINAD reading of received signal if SINAD is selected. Displays modulation reading in units of selected Demodulation Type (5) if Modulation is selected. This field is interactive with DISTORTION/ SINAD/MODULATION Reading (11). This field displays complete meter while DISTORTION/ SINAD/ MODULATION Reading (11) displays reading only. The same reading cannot be displayed twice. Selection of a specific reading changes source of nonedited field to other source. One source must always be Modulation.

Soft Function Keys available with this function include:

F1 ZOOM
Selects Meter Operation Screen of currently active meter.

F2 SINAD
Selects SINAD Meter as active meter. Blank if SINAD currently active.

F3 DIST
Selects Distortion Meter as active meter. Blank if DIST currently active.

F4 DEV
Selects Modulation Meter as active meter. Blank if DEV currently active. Modulation reading unit type is tied to Demodulation Type (5).

13. Soft Function Key Definitions

Functions are redefined with each field of the current operation screen.

14. Power/Received Level Meter

Power Meter displays power level of signal received through T/R Connector only in dB and Watts. RECEIVED LEVEL Meter displays referenced Power Level of signal received through ANTENNA Connector only in dBm and μV.

Soft Function Keys available with this function include:

F1 ZOOM
Selects Meter Operation Screen of currently active meter.

15. RF ERROR Meter

Displays difference in RF Field (2) and frequency of received signal.

Soft Function Keys available with this function include:

F1 ZOOM
Selects Meter Operation Screen of RF ERROR Meter.

16. AF FREQUENCY Meter

Displays Audio Frequency of received signal.

Soft Function Keys available with this function include:

F1 ZOOM
Selects Meter Operation Screen of AF FREQUENCY Meter.

17. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

18. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions.

Soft Function Keys available with this function include:

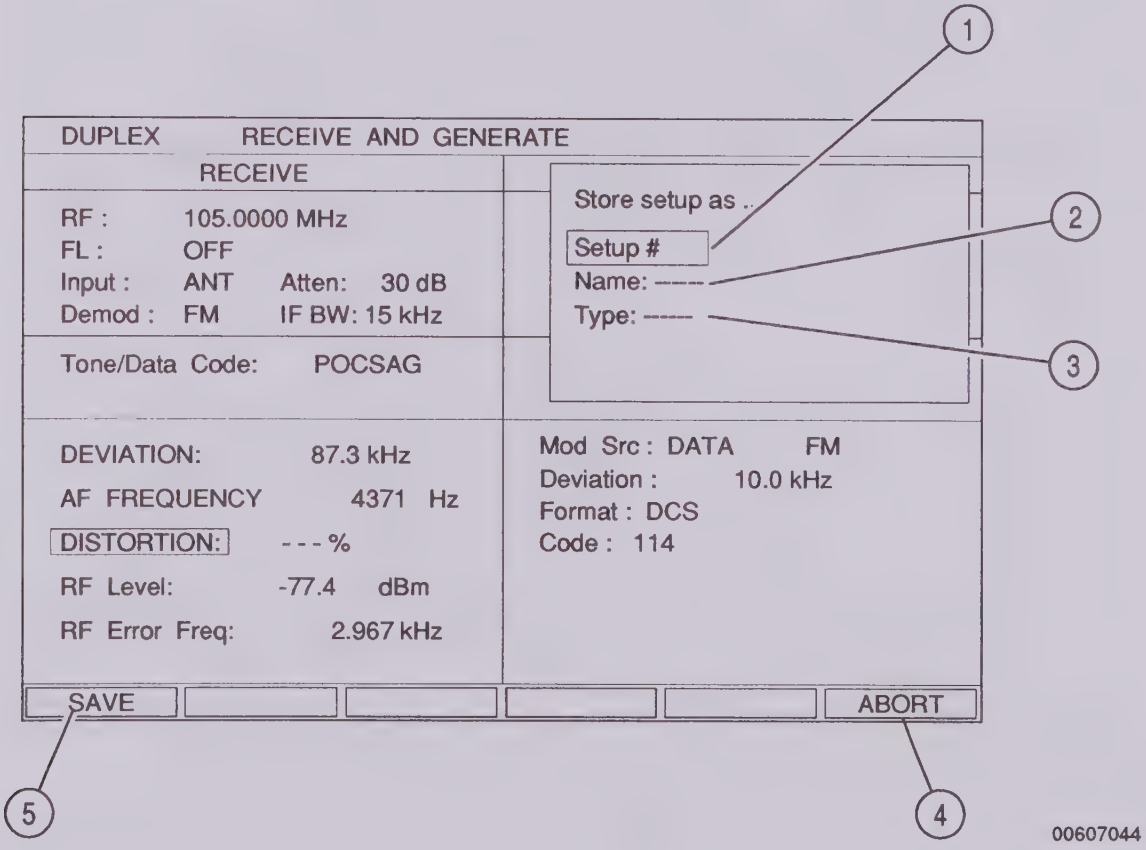
F1 ZOOM
Accesses expanded version of active function.

F2 ANALY/SCOPE
Accesses inactive function. If SCOPE is active, displays ANALY. If ANALYZER is active, displays SCOPE.

D. STORE AND RECALL OPERATION

Pressing STORE Memory Key allows the operator to store up to 50 Duplex Operation Screen configurations. Storage Locations 0 through 49 can be used to store an RF Generate Operation configuration, RF Receive Operation configuration or Duplex Operation configuration (Receive and Generate pair).

Pressing STORE Memory Key when in Duplex Operation Screen accesses the following fields:



1. Setup #

Displays selected Memory Location for storage of current configuration.

2. Name

Displays optional alphanumeric label for selected Memory Location.

3. Type

Displays the type of data currently saved in the specified setup number. Available types to save and recall are: DUPLEX, GENERATOR, RECEIVER and EMPTY.

4. ABORT Soft Function Key F6

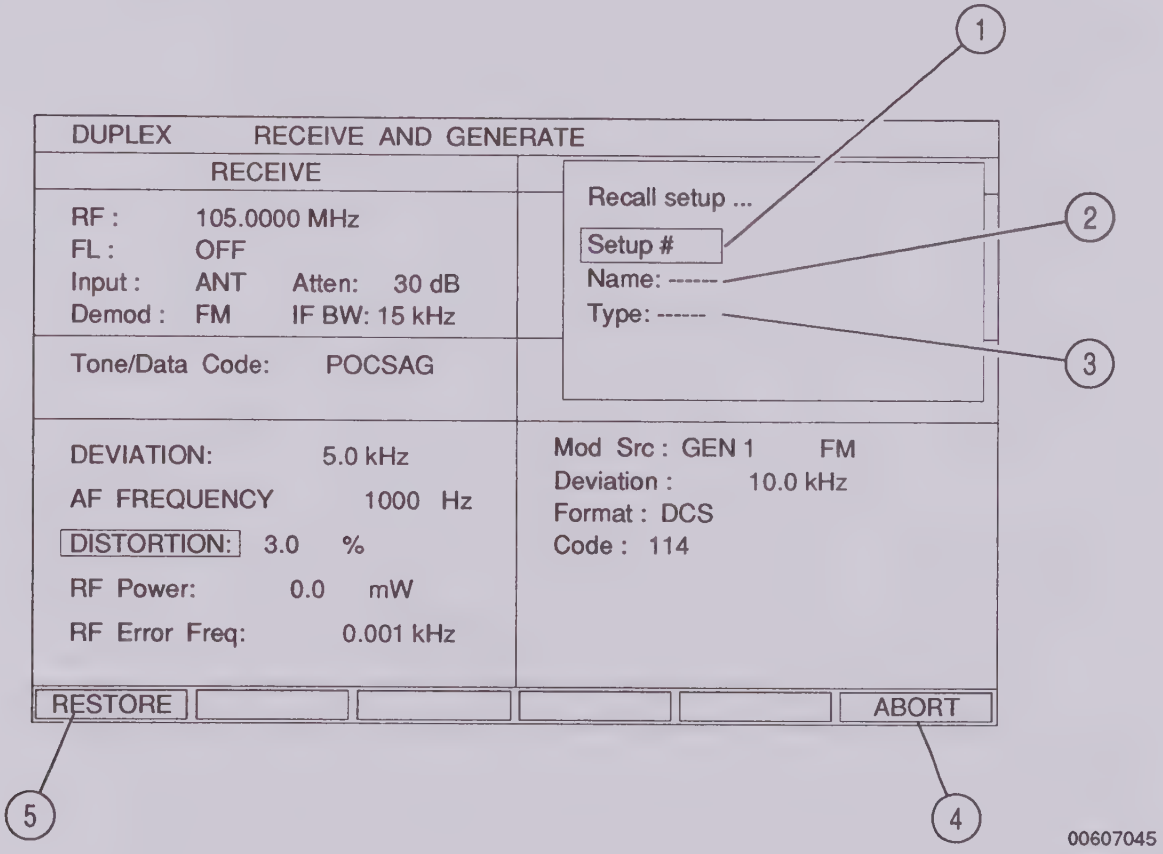
Escapes Storage Operation without editing. Press SAVE Soft Function Key F1 (5) or ABORT Soft Function Key F6 to return to normal operation.

5. SAVE Soft Function Key F1

Finalizes Storage Operation. Press SAVE Soft Function Key F1 or ABORT Soft Function Key F6 (4) to return to normal operation.

Pressing RCL Memory Key allows the operator to recall up to 100 previously stored operation screens. RF Receive, RF Generate or Duplex Operation Screen configurations and all can be accessed from the Duplex Operation Screen. Accessing anything other than a Duplex Operation Screen configuration, automatically switches the COM-120B to the selected mode of operation.

Pressing RCL Memory Key when in Duplex Operation Screen accesses the following fields:



1. Setup #

   Displays selected Memory Location for recall of stored configuration.

2. Name

   Displays optional alphanumeric label for selected Memory Location.

3. Type

   Displays the type of data saved in the specified setup number. Available types to save and recall are: DUPLEX, GENERATOR, RECEIVER and EMPTY.

4. ABORT Soft Function Key F6

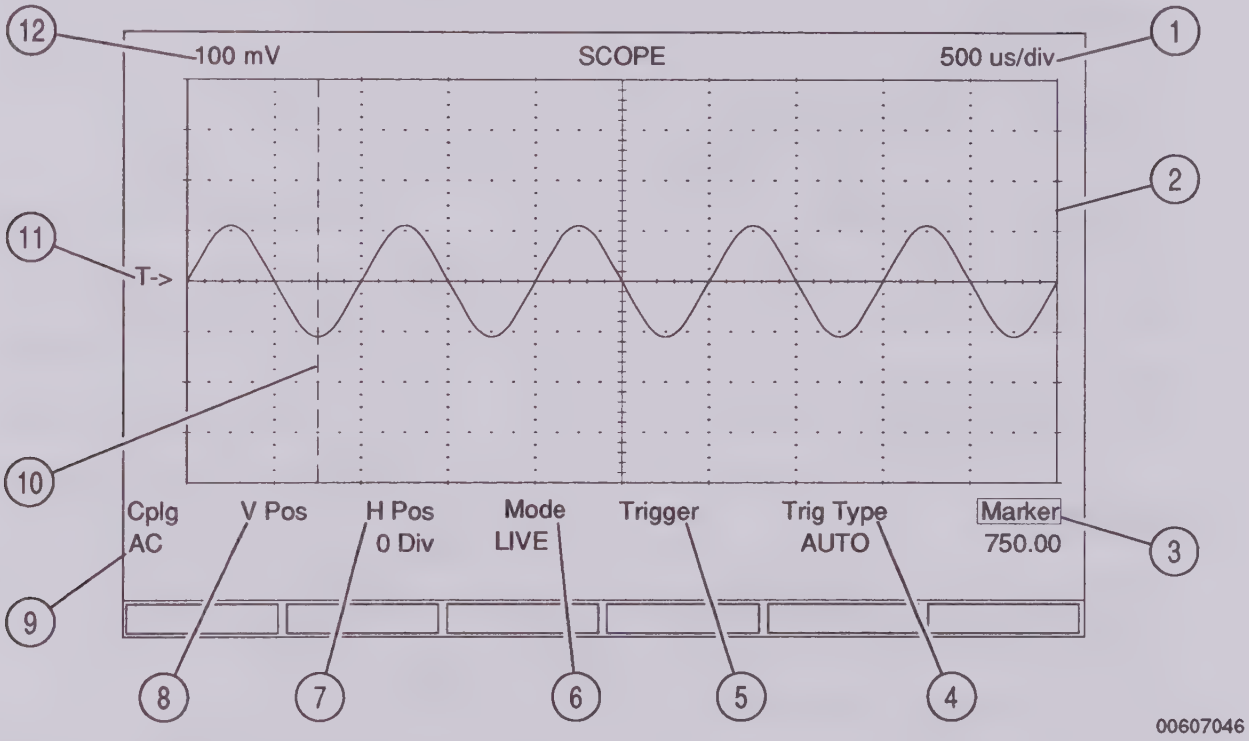
Escapes Storage Operation without performing any edit. Press RESTORE Soft Function Key F1 (5) or ABORT Soft Function Key F6 to return to normal operation.

5. RESTORE Soft Function Key F1

Finalizes Recall Operation. Press RESTORE Soft Function Key F1 or ABORT Soft Function Key F6 (4) to return to normal operation.

3-3-4 OSCILLOSCOPE OPERATION SCREEN

The Independent Oscilloscope Operation Screen operates as an independent piece of test equipment. Input for Oscilloscope Operation is through the SCOPE/DVM Connector. The Oscilloscope Operation Screen is accessed by pressing the SCOPE Instruments Key. When accessed, the Oscilloscope Operation Screen is set up in the configuration last used.



Oscilloscope Operation Screen

1. Sweep

Displays selected Oscilloscope Sweep. Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Scale.

F6 RETURN
Exits Menu into normal operation.

F2 ROLL
Views the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.

F2 SLOW
Returns to the normal mode of operation.

2. Oscilloscope Screen

Displays digitized trace of specified signal.

3. Marker Position

Displays current Marker Position if Marker (10) is active or OFF if inactive. Value for Marker Position is in same units as Sweep (1) with Trigger point as reference.

Soft Function Keys available with this function include:

F1 On/Off
Toggles Marker (10) between ON and OFF.

4. Trigger Type

Displays selected Trigger Type. Selections include Auto, One Shot and Normalized.

Soft Function Keys available with this function include:

F1 NORM
Selects Normalized as Trigger Type.

F2 AUTO
Selects Auto as Trigger Type.

F3 1 SHOT
Selects One Shot as Trigger Type. Pressing 1 SHOT Soft Function Key reenables Trigger.

5. Trigger

Adjusts trigger level as indicated by Trigger Level Indicator (11) when accessed.

6. Mode

Displays selected Operation Mode. Selections include Live, Compare, Recall, Store AND Average.

Soft Function Keys available with this function include:

F2 LIVE
Selects LIVE as Oscilloscope Operation Mode.

F3 AVG
Selects AVERAGE as Oscilloscope Operation Mode.

F4 COMPARE
Selects COMPARE as Oscilloscope Operation Mode.

F5 RECALL
Selects RECALL as Oscilloscope Operation Mode.

F6 STORE
Selects STORE as Oscilloscope Operation Mode.

7. H Pos

Displays selected horizontal offset in major divisions. Selections range from -10 to +10 Divisions.

8. V Pos

Accesses vertical position of trace. Trace above or below screen is indicated by straight line trace at top or bottom graticule.

9. Coupling

Displays selected Oscilloscope Coupling. Selections include AC, DC and GND (Ground).

Soft Function Keys available with this function include:

F1 GND
Selects GND (Ground) as Oscilloscope Coupling.

F2 AC
Selects AC as Oscilloscope Coupling.

F3 DC
Selects DC as Oscilloscope Coupling.

10. Marker

User editable Marker controlled using MARKER Position (3). Movable through extent of visible screen.

11. Trigger Level Indicator

Indicates approximate level of Oscilloscope Trigger Level. Editable using TRIGGER (5).

12. Oscilloscope Scale

Displays selected Oscilloscope Vertical Scale. Scales available include:

10 mV	20 mV	50 mV
100 mV	200 mV	500 mV
1 V	2 V	5 V
10 V	20 V	50 V

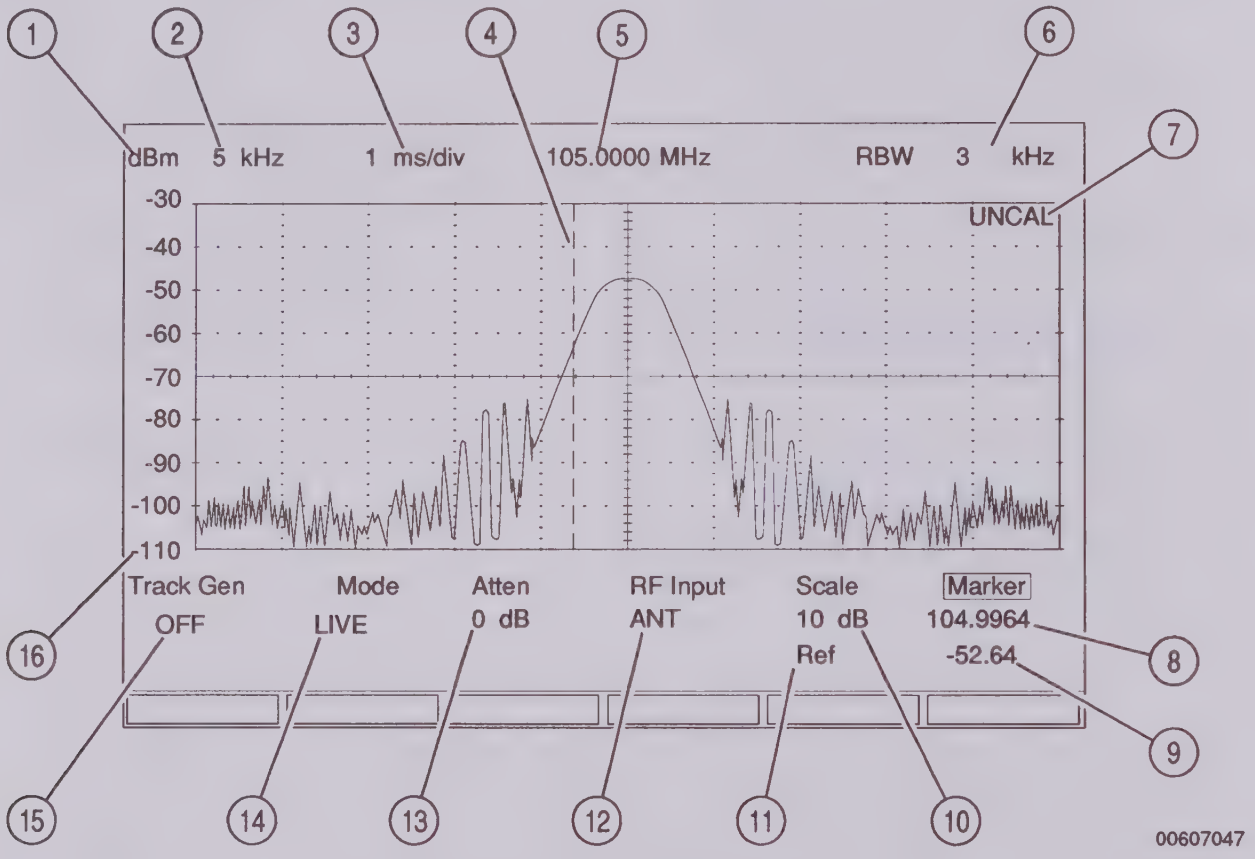
Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Scale. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into normal operation.

3-3-5 SPECTRUM ANALYZER OPERATION SCREEN

The Independent Spectrum Analyzer Operation Screen operates independent of the Test Modes. The Spectrum Analyzer Operation Screen is accessed by pressing the ANLYZ Instruments Key. When accessed, the Spectrum Analyzer Operation Screen is set up in the configuration last used.



Spectrum Analyzer Operation Screen

1. Logarithmic Function

   Displays Logarithmic Function for referencing Vertical Scale (14). Selections include dBm, dBµV, dBmV, dBV, dBµW and dBW.

   Soft Function Keys available with this function include:

   F1 dBm
   Selects dBm as Logarithmic Function.

   F2 dBµV
   Selects dBµV as Logarithmic Function.

F3 dBmV
Selects dBmV as Logarithmic Function.

F4 dBV
Selects dBV as Logarithmic Function.

F3 dBμW
Selects dBμW as Logarithmic Function.

F4 dBW
Selects dBW as Logarithmic Function.

2. Scan Width

Displays selected Scan Width per division. Selections include zero scan and:

1 kHz	2 kHz	5 kHz
10 kHz	20 kHz	50 kHz
100 kHz	200 kHz	500 kHz
1 MHz	2 MHz	5 MHz
10 MHz	20 MHz	50 MHz
100 MHz		

F1 MENU
Accesses Menu to set Scan Width. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into normal operation.

F6 COUPLE
Sets the sweep and RBW to factory default state for the current scan width.

3. Zero Scan Sweep

Displays selected Sweep per division. Selections include:

200 μs/div	500 μs/div	1 ms/div
2 ms/div	5 ms/div	10 ms/div
20 ms/div	50 ms/div	100 ms/div
200 ms/div	500 ms/div	

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Zero Scan Sweep. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into normal operation.

F5 DEFLT
Sets only the current field to factory default.

F6 COUPLE
Sets the sweep and RBW to factory default state for the current scan width.

4. Marker

Marker controlled using Marker Position (8). Movable through extent of visible screen.

5. Center Frequency

Displays Center Frequency. Selections range from 0.0000 to 1000.0000 MHz. For Scan Widths 32 MHz/div, start and stop frequencies must be above 0 MHz and below 1000 MHz.

F1 Set Ref
Adjusts Spectrum Analyzer to reference level. Function must be performed when frequency is changed for greatest accuracy.

F2 Find
Starts Find Function. Find Function searches for first signal with level exceeding reference set by Find Lvl Soft Function Key F3. Search limits are twice Sweep Width, set by Config Soft Function Key F4, centered around Center Frequency.

F3 Find Lvl
Sets Find Function reference level. Activates horizontal Marker to set level. Marker level is set by DATA SCROLL Keys or DATA SCROLL Spinner. Press Soft Key to exit.

F4 Config
Accesses window for setting Sweep Width for Find Function. Range of Sweep Width is 0.2000 to 500.0000 MHz. Press Soft Key to exit.

F5 Split
Accesses Split Screen Function. Split Screen Spectrum Analyzer allows two Center Frequencies. Soft Function Keys available with this function include:

F1 Normal
Sets Spectrum Analyzer to Normal single Center Frequency Operation.

F6 LOCK/UNLOCK
Sets RF Generate RF Field and RF Receive RF Field to frequency of Center Frequency. Edits to RF Field or Center Frequency change all values. With Function active, L is displayed by Center Frequency and label is UNLOCK.

6. Resolution Bandwidth

Displays editable Resolution Bandwidth field for selected Scan Width (2).

300 Hz	3 kHz	30 kHz
300 kHz	3 MHz	

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Resolution Bandwidth. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into normal operation.

F5 DEFLT
Sets only the current field to factory default.

F6 COUPLE
Sets the sweep and RBW to factory default state for the current scan width.

7. UNCAL

Displays UNCAL for settings that cause an uncalibrated condition.

8. Marker Position

Displays Marker Position if Marker (4) is active or OFF if inactive.

Soft Function Keys available with this function include:

F1 On/Off
Toggles Marker (3) between ON and OFF.

9. Marker Level

Displays current Marker Level if Marker (4) is active. Displays Blank if Marker (4) is OFF.

10. Scale

Displays Logarithmic Scale for Vertical Scale (16). Selections are 2 and 10 dB.

F1 10 dB
Selects 10 dB Logarithmic Scale for Spectrum Analyzer Vertical Scale (14).

F2 2 dB
Selects 2 dB Logarithmic Scale for Spectrum Analyzer Vertical Scale (14).

11. Reference

Adjusts Spectrum Analyzer Vertical Scale (16) ±10 dB when Scale (10) is set to 10 dB. When Scale (10) is set to 2 dB, adjusts Spectrum Analyzer Vertical Scale (16) through full range, displaying 16 dB window and incrementing in 1 dB steps.

12. RF Input

Displays RF Input. Selections are ANT (ANTENNA Connector) and T/R (T/R Connector).

Soft Function Keys available with this function include:

F1 T/R
Selects T/R Connector as RF Input Connector.

F2 ANT
Selects ANTENNA Connector as RF Input Connector.

13. Attenuation

Displays selected Attenuation for RF Input (12). Selections include 0 and 30 dB.

Soft Function Keys available with this function include:

F1 30 dB
Selects 30 dB Attenuation for RF Input (12).

F2 0 dB
Selects 0 dB Attenuation for RF Input (12).

14. Mode

Displays Operation Mode. Selections include Peak Hold, Live, Compare, Recall, Store and Average.

Soft Function Keys available with this function include:

F1 PKHOLD
Selects PEAK HOLD as Spectrum Analyzer Operation Mode.

F2 LIVE
Selects LIVE as Spectrum Analyzer Operation Mode.

F3 AVG
Selects AVERAGE as Spectrum Analyzer Operation Mode.

F4 COMPARE
Selects COMPARE as Spectrum Analyzer Operation Mode.

F5 RECALL
Selects RECALL as Spectrum Analyzer Operation Mode.

F6 STORE
Selects STORE as Spectrum Analyzer Operation Mode.

15. Tracking Generator (Option 12)

Displays Tracking Generator Signal level available at AUX RF OUT Connector when active and OFF when inactive. Displayed only with Option 12 installed.

Soft Function Keys available with this function include:

F1 On/Off
Sets Tracking Generator (Option 12) ON or OFF.

16. Vertical Scale

Provides logarithmic scale for trace. Position is controlled by Reference (11).

3-3-6 AUDIO/DATA/SIGNALING GENERATORS OPERATION SCREEN

The Audio/Data/Signaling Generators Operation Screen operates as an independent piece of test equipment. The Audio/Data/Signaling Generators Operation Screen is accessed by pressing the AUDIO GEN Instruments Key. When accessed, the Audio/Data/Signaling Generators Operation Screen is set up in the configuration ast used.

Because of the level of detail required to fully describe the Audio/Data/Signaling Generators Operation Screen, the information is split into several sections. The first section gives a description of the main screen.

A. Audio/Data/Signaling Generators General Operation Screen

B. Audio Generator 1

C. Audio Generator 2

D. DTMF Generator

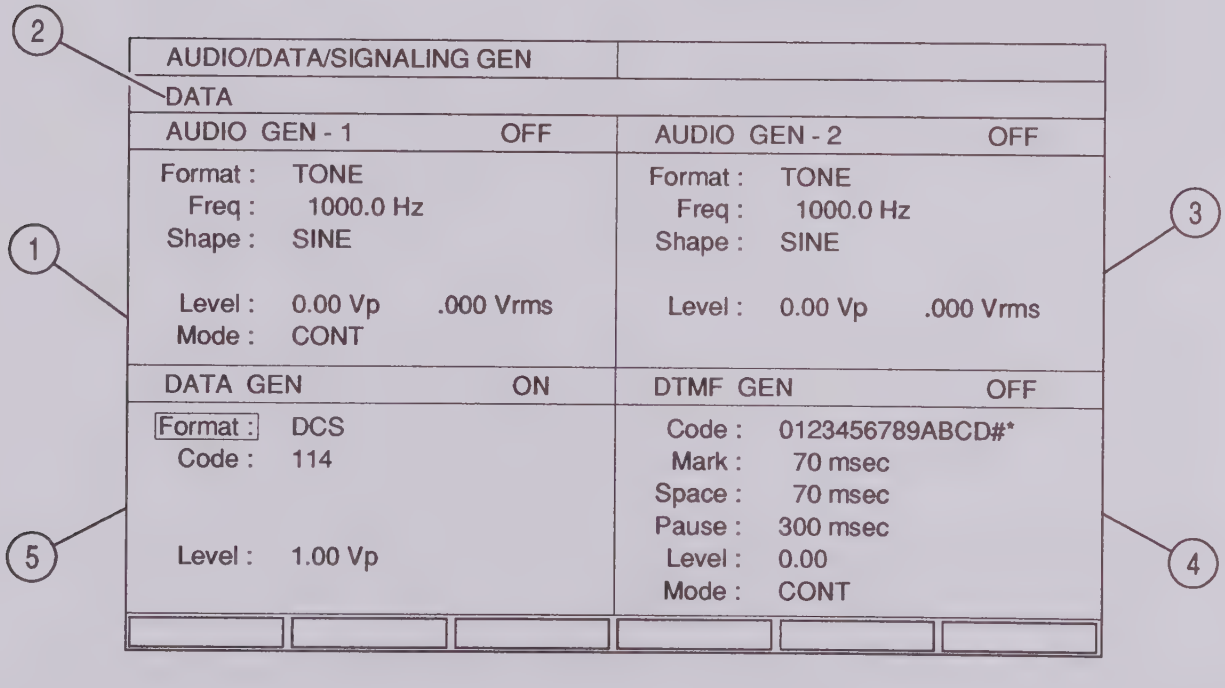
E. DATA Generator

A. AUDIO/DATA/SIGNALING GENERATORS GENERAL OPERATION SCREEN

The Audio/Data/Signaling Generators Operation Screen displays four different generators simutaneously. Generators displayed include Audio Generator 1, Audio Generator 2, DTMF Generator and DATA Generator. Any or all of these sources may be active. Output for these generators is through the AUDIO/DATA GEN Connector.

Editing these sources can be performed from this screen, the RFReceive Operation Screen or the Duplex Receive Operation Screen.

Pressing AUDIO GEN Instruments Key accesses Audio/Data/Signaling Generators Operation Screen. When accessed, the Audio/Data/Signaling Generators Operation Screen is set up in the configuration last used.



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Audio/Data/Signaling Generator Operation Screen

1. Audio Generator 1 Section

Defines and activates Audio Generator 1.

2. Active Source Block

Displays all active sources. Sources include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator) and DATA (DATA Generator).

3. Audio Generator 2 Section

Defines and activates Audio Generator 2.

4. DTMF Generator Section

Defines and activates DTMF Generator.

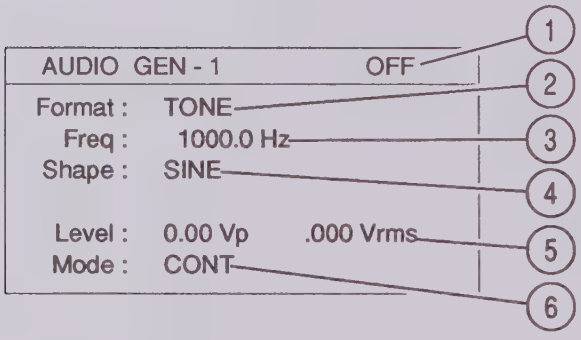
5. DATA Generator Section

Defines and activates DATA Generator.

B. AUDIO GENERATOR 1

The Audio/Data/Signaling Generators Operation Screen displays four different generators simutaneously. Generators displayed include Audio Generator 1, Audio Generator 2, DTMF Generator and DATA Generator. Any or all of these sources may be active. Output for generators is through the AUDIO/DATA GEN Connector. Editing these sources is performed from this screen, the RF Receive Operation Screen or the Duplex Receive Operation Screen.

Functions and parameters for Audio Generator 1 are as follows:



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1. Audio Generator 1 Prompt

Activates selected Generator Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator) and DATA (DATA Generator).

Soft Function Keys available with this function include:

F1 GEN1
Activates Audio Generator 1.

F2 GEN2
Activates Audio Generator 2.

F3 DATA
Activates DATA Generator.

F4 DTMF
Activates DTMF Generator.

2. Format

Displays Format type for Audio Generator 1. Selections in standard COM-120B are limited to TONE and USER.

Additional selections are shown, but are unusable unless Option 09 or Option 11 is installed. Refer to Section 6 for additional information on options. Additional selections available include:

EEA	EURO	EIA
5/6 TONE	ZVEI	NATEL
DZVEI	10 PS	DDZVEI
20 PS	CCIR	MTS
CCIRH	IMTS	CCIRH4
TONE REMOTE		

Soft Function Keys available with this function include:

F1 MENU
Accesses menu for selecting Format. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into normal operation.

Additional Soft Function Keys available when USER is selected as Format include:

F2 CONFIG
Accesses Configuration Window for configuring User Selectable Frequency and Duration for codes 0 through 9 and A through T. With Configuration Window active, Soft Function Keys are defined as follows:

F1 PG UP
Used to scroll up through Configuration Window.

F2 PG DN
Used to scroll down through Configuration Window.

F3 FILL
Fills remainder of selected column with value of current cursor position.

F6 RETURN
Exits Configuration Window into normal operation.

Additional Soft Function Keys available when TONE REMOTE is selected as Format include:

F2 XMIT
Activates Tone Remote generation.

3. Tone Frequency

Displays selected Audio Tone Frequency. Selections range from 5 to 20000 Hz with SINE selected as Shape (4) and 5 to 10000 Hz for other settings of Shape (4). Visible as Tone Frequency only when TONE or TONE Remote is active Format (2).

4. Shape

Displays selected Wave Shape of Modulation Source. Selections include SINE, SQUARE, RAMP and TRIANGLE. Active only with TONE selected as Format (2).

Soft Function Keys available with this function include:

F1 SINE
Selects SINE as active Wave Shape.

F2 RAMP
Selects RAMP as active Wave Shape.

F3 TRIANGLE
Selects TRIANGLE as active Wave Shape.

F4 SQUARE
Selects SQUARE as active Wave Shape.

5. Level

Displays selected Level of Audio Generator 1. Selections range from 0 to 2.5 Vp in X1 (times 1) Mode and 0 to 250 mVp in /10 (divide by 10) Mode. Level is displayed in Vrms.

Soft Function Keys available with this function include:

F1 X1
Activates X1 Mode for Level.

F2 /10
Activates /10 Mode for Level.

6. Mode

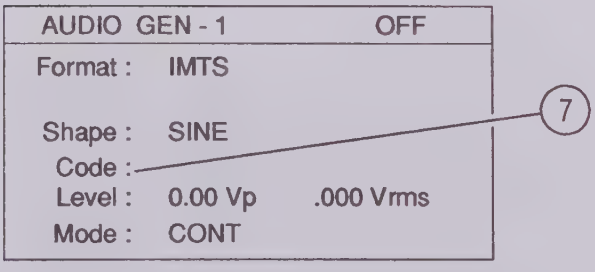
Displayed selected Mode for generation of signal. Selections are CONT (Continuous) and BURST. Additionally, if TONE is selected as Format (2) and BURST Mode is selected, T= field appears for entering duration time for TONE Burst. Time duration ranges from 0 to 30 seconds.

Soft Function Keys available with this function include:

F1 CONT
Selects Continuous Output Mode for Audio Generator 1.

F2 BURST
Selects Burst Output Mode for Audio Generator 1.

With Format (2) set to any selection other than TONE or TONE REMOTE, the following field appears in place of Tone Frequency (3).



00607048

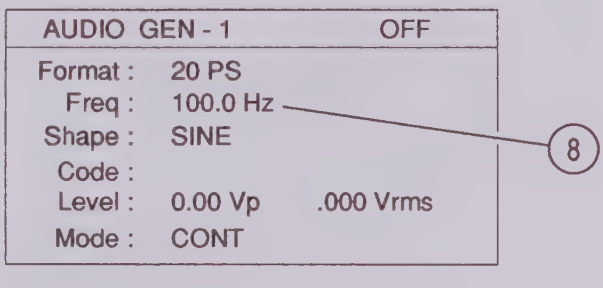
7. Code

Displays selected code for specified Format (2).

Soft Function Keys available with this function include:

F1 CLEAR
Clears current CODE entry.

With Format (2) set to 10 PS or 20 PS the following field appears.



00607049

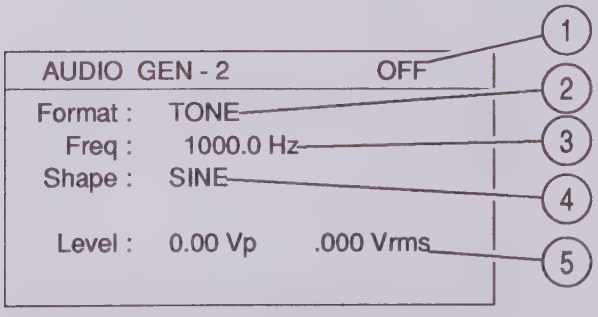
8. Tone Freq

Displays selected Pulse Frequency. Selection ranges from 5 to 20000 Hz.

C. AUDIO GENERATOR 2

The Audio/Data/Signaling Generators Operation Screen displays four different generators simutaneously. Generators displayed include Audio Generator 1, Audio Generator 2, DTMF Generator and DATA Generator. Any or all of these sources may be active. Output for generators is through the AUDIO/ DATA GEN Connector. Editing these sources is performed from this screen, the RF Receive Operation Screen or the Duplex Receive Operation Screen.

Functions and parameters for Audio Generator 2 are as follows:



8717065

1. Audio Generator 2 Prompt

Activates selected Generator Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator) and DATA (DATA Generator).

Soft Function Keys available with this function include:

F1 GEN1
Activates Audio Generator 1.

F2 GEN2
Activates Audio Generator 2.

F3 DATA
Activates DATA Generator.

F4 DTMF
Activates DTMF Generator.

2. Format

Displays Format type for Audio Generator 2. Selection is limited to TONE.

3. Tone Frequency

Displays selected Audio Tone Frequency for Audio Generator 2. Selection is 5 kHz to 20000 kHz tone.

4. Shape

Displays selected Wave Shape for Audio Generator 2. Selections include all wave shapes: SINE, RAMP, TRIANGLE and SQUARE.

5. Level

Displays selected Level of Audio Generator 2. Selections range from 0 to 2.5 Vp in X1 (times 1) Mode and 0 to 250 mVp in /10 (divide by 10) Mode. Level is displayed in Vrms.

Soft Function Keys available with this function include:

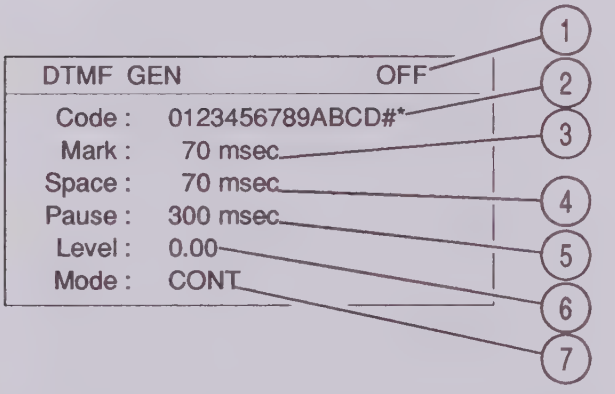
F1 X1
Activates X1 Mode for Level.

F2 /10
Activates /10 Mode for Level.

D. DTMF GENERATOR

The Audio/Data/Signaling Generators Operation Screen displays four different generators simutaneously. Generators displayed include Audio Generator 1, Audio Generator 2, DTMF Generator and DATA Generator. Any or all of these sources may be active. Output generators is through the AUDIO/DATA GEN Connector. Editing these sources is performed from this screen, the RF Receive Operation Screen or Duplex Receive Operation Screen.

Functions and parameters for DTMF Generator are as follows:



8717067

1. DTMF Generator Prompt

Activates selected Generator Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator) and DATA (DATA Generator).

Soft Function Keys available with this function include:

F1 GEN1
Activates Audio Generator 1.

F2 GEN2
Activates Audio Generator 2.

F3 DATA
Activates DATA Generator.

F4 DTMF
Activates DTMF Generator.

2. Code

Displays selected Code for DTMF Generator.

Soft Function Keys available with this function include:

F1 CLEAR
Clears code field of current data.

3. Mark Time

Displays selected dwell time for DTMF tones. Value range: 10 to 999 ms.

4. Space Time

Displays selected pause time between DTMF tones. Value range: 1 to 999 ms.

5. Pause Time

Displays selected Pause Time between DTMF tone sequences for continuous function. Value range: 1 to 999 ms.

6. Level

Displays selected Level of Audio Generator 1. Selections range from 0 to 2.5 Vp in X1 (times 1) Mode and 0 to 250 mVp in /10 (divide by 10) Mode.

Soft Function Keys available with this function include:

F1 X1
Activates X1 Mode for Level.

F2 /10
Activates /10 Mode for Level.

7. Mode

Displayed selected Mode for generation of signal. Selections are CONT (Continuous), BURST and KEY. Burst Mode activates DTMF Generator for one loop of selected code. Key Mode configures DATA ENTRY Keys as DTMF Keypad.

Soft Function Keys available with this function include:

F1 CONT
Selects Continuous Output Mode for DTMF Generator.

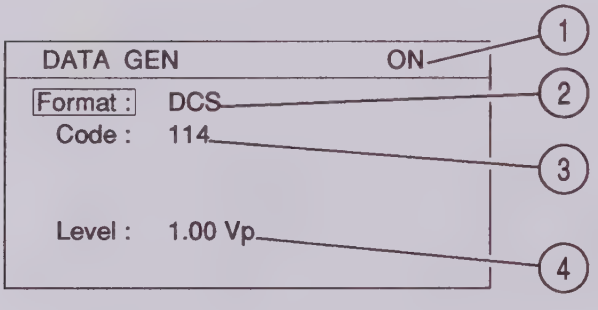
F2 BURST
Selects Burst Output Mode for DTMF Generator.

F3 KEY
Configures DATA ENTRY Keys as DTMF keypad with current key pressed, displayed in Code Field.

E. DATA GENERATOR

The Audio/Data/Signaling Generators Operation Screen displays four different generators simutaneously. Generators displayed include Audio Generator 1, Audio Generator 2, DTMF Generator and DATA Generator. Any or all of these sources may be active. Output for generators is through the AUDIO/DATA GEN Connector. Editing these sources is performed from this screen, RF Receive Operation Screen or Duplex Receive Operation Screen.

Functions and parameters for DATA Generator are as follows:



8717066

1. DATA Generator Prompt

Activates selected Generator Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator) and DATA (DATA Generator).

Soft Function Keys available with this function include:

F1 GEN1
Activates Audio Generator 1.

F2 GEN2
Activates Audio Generator 2.

F3 DATA
Activates DATA Generator.

F4 DTMF
Activates DTMF Generator.

2. Format

Displays Format type for DATA Generator. Selections include DCS and DCS/ (DCS Inverted).

Soft Function Keys available with this function include:

F1 DCS
Selects DCS as Format type. Activates CODE Field.

F2 DCS/
Selects Inverted DCS as Format type. Activates CODE Field.

3. Code

Displays selected code for DATA Generator.

4. Level

Displays selected Level of DATA Generator. Selections range from 0 to 2.5 Vp in X1 (times 1) Mode and 0 to 250 mVp in /10 (divide by 10) Mode.

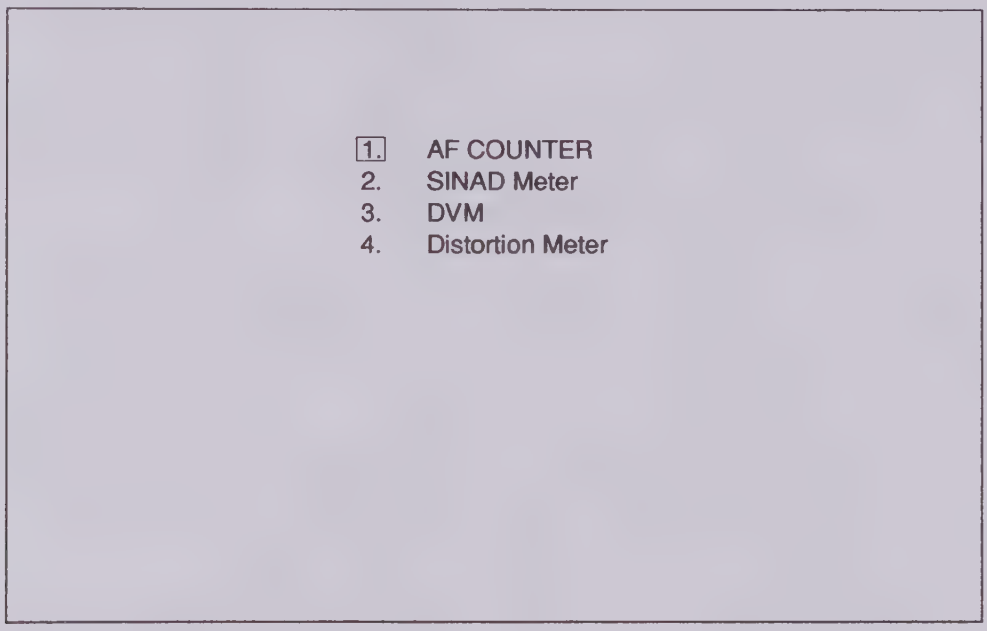
Soft Function Keys available with this function include:

F1 X1
Activates X1 Mode for Level.

F2 /10
Activates /10 Mode for Level.

3-3-7 METERS OPERATION

The COM-120B contains several meters that are not tied to any Generate or Receive Function. These meters operate independently. Pressing MTRS Instruments Key accesses a Meters Menu for accessing independent Meters. To access a meter, place cursor on selection and press ENTER Key.



8717017

Meters Menu

A. Audio Frequency Counter

B. SINAD Meter

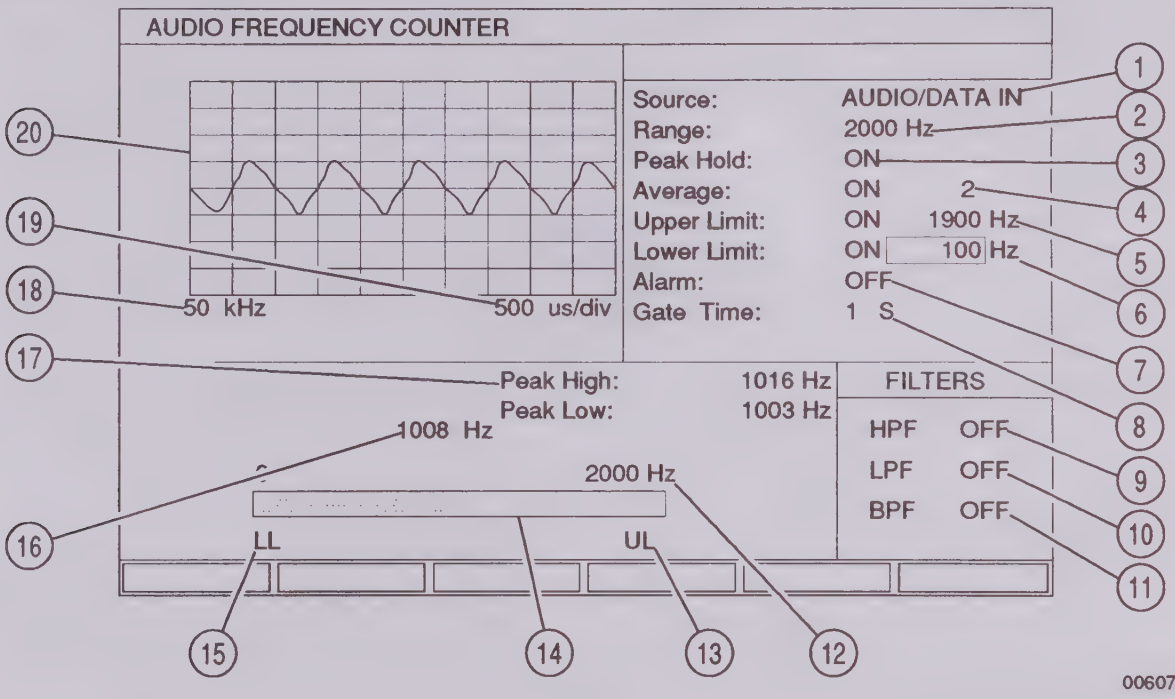
C. Digital Voltmeter

D. Distortion Meter

A. AUDIO FREQUENCY COUNTER

The Audio Frequency (AF) Counter counts the audio signal that is supplied at the indicated Source.

Information provided is displayed as follows:



1. Source

Displays input source for Audio Frequency Counter. Sources include AUDIO/DATA IN Connector (AUD/DAT), RF Power Meter input line (RF POW), EXT MOD Connector (EXT MOD) and SCOPE/DVM Connector (SC/DVM).

Soft Function Keys available with this function include:

F1 AUD/DAT
Selects AUDIO/DATA IN Connector as input source for meter.

F2 RF POW
Selects RF Power Meter input line as input source for meter.

F3 EXT MOD
Selects EXT MOD Connector as input source for meter.

F4 SC/DVM
Selects SCOPE/DVM Connector as input source for meter.

F5 RST PK
Resets Peak Hold Function.

F6 Returns Test Set to Meters Menu.

2. Range

Displays Upper Range. Selections include Autorange, 200 Hz, 2000 Hz and 20 kHz.

Soft Function Keys available with this function include:

F1 200 Hz
Selects 200 Hz for current Range.

F2 2000 Hz
Selects 2 kHz for current Range.

F3 20 kHz
Selects 20 kHz for current Range.

F4 AUTO
Sets Meter to Autorange.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

3. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. Not valid in Autorange.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

4. Average

Displays Averaging Function status and number of samples when active. Status is OFF or ON. Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

5. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range of value is 0 to 20000 Hz.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

6. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range of value is 0 to 20000 Hz.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

7. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Alarm sounds when signal exceeds Upper Limit (5) or is below Lower Limit (6).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

8. Gate Time

Displays Gate Time for reading signal frequency. Selections include 1 and 10 sec. 1 sec Gate Time reads faster and is less accurate than 10 sec Gate Time.

Soft Function Keys available with this function include:

F1 1 S
Selects 1 second Gate Time.

F2 10 S
Selects 10 seconds Gate Time.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

9. High-Pass Filter (HPF)

Displays selected Highpass Filter setting. Selections include 4 kHz, 300 Hz and OFF.

High-Pass/Low-Pass Filter combination and Bandpass filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets High-Pass Filter to OFF, deactivating all high-pass filters.

F2 300 Hz
Activates 300 Hz High-Pass Filter.

F3 4 kHz
Activates 4 kHz High-Pass Filter.

F6 RETURN
Returns Test Set to Meters Menu.

10. Low-Pass Filter (LPF)

Displays current Low-Pass Filter setting. Selections include OFF, 300 Hz, 4 kHz and 20 kHz.

High-Pass/Low-Pass Filter combination and Bandpass filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Low-Pass Filter to OFF, deactivating all low-pass filters.

F2 300 Hz
Activates 300 Hz Low-Pass Filter.

F3 4 kHz
Activates 4 kHz Low-Pass Filter.

F4 20 kHz
Activates 20 kHz Low-Pass Filter.

F6 RETURN
Returns Test Set to Meters Menu.

11. Bandpass Filter (BPF)

Displays current Bandpass Filter setting. Selections include C-Message Weighted Filter and OFF.

High-Pass Filter/Low-Pass Filter combination and Bandpass filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF, deactivating all bandpass filters.

F1 C-MSG
Activates C-Message Weighted Bandpass Filter.

F6 RETURN
Returns Test Set to Meters Menu.

12. Upper Range Limit Readout

Displays current value of Range (2). Redefined as needed if Autorange is active.

13. Upper Limit Bar

Indicates position of Upper Limit (5) on Bar Meter (14). If Upper Limit (5) exceeds Range (2), marker is not visible.

14. Bar Meter

Relative Graphic display of current Meter reading.

15. Upper Limit Bar

Indicates position of Lower Limit (6) on Bar Meter (14). If Upper Limit (10) exceeds Range (2), marker is not visible.

16. Frequency Reading

Displays current Audio Frequency of demodulated signal in Hz.

17. Peak Readings

Displays current high and low Peak readings when Peak Hold (3) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

18. Scope Scale

Displays selected scale for Oscilloscope. Selections change depending on selected Source (1). Selections include:

Source (1)	Scale
AUD/DAT	100, 200, 500 mV/Div 1, 2, 5 V/Div
RF POW	LOW (2 mW to 20 mW signal) MED (>20 mW to 2 W signal) HIGH (>2 W to 200 W signal)
EXT MOD	100, 200, 500 mV/Div 1, 2, 5 V/Div
SCP/DVM	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div

Soft Function Keys available with this function include:

F1 MENU
Displays selections for Scope Scale. Soft Function Keys available with this function include:

F6 RETURN
Returns Test Set to normal AF Counter Operation.

19. Scope Sweep

Displays selected Oscilloscope Sweep time per division. Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

Soft Function Keys available with this function include:

F1 MENU
Access Menu to set Oscilloscope Scale.

F6 RETURN
Exits Menu into normal operation.

F2 ROLL
Views the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.

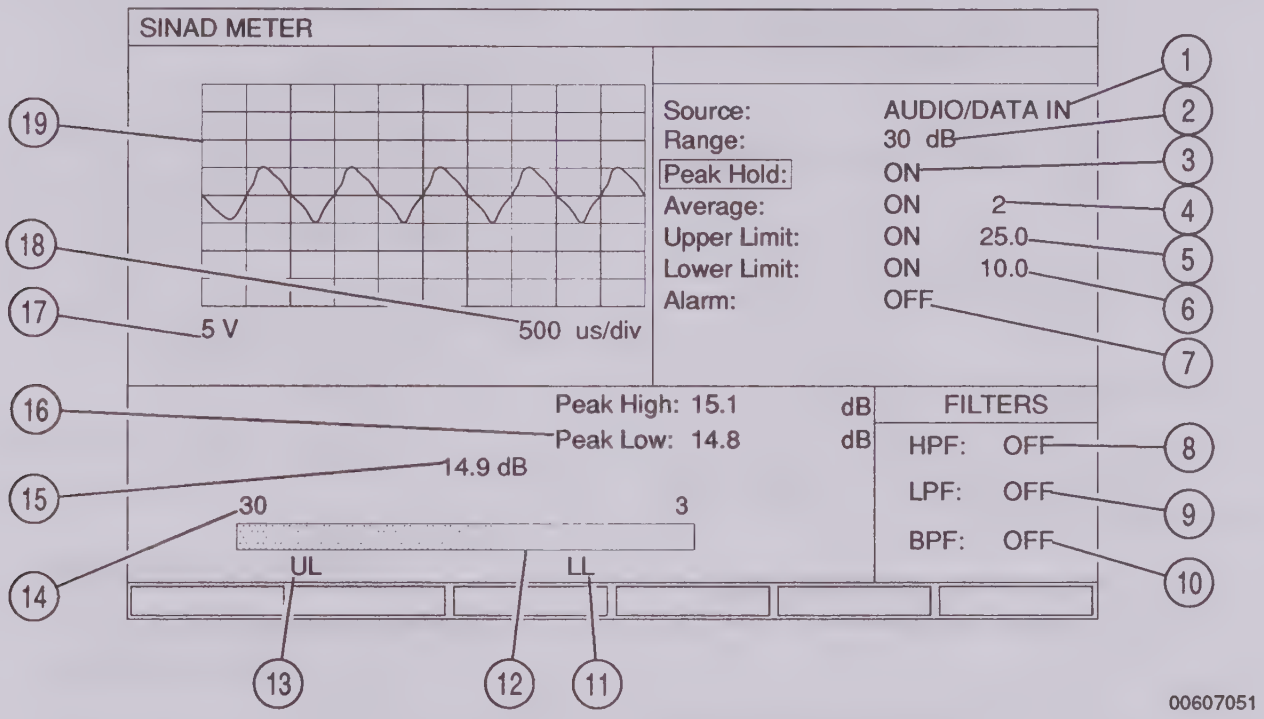
F2 SLOW
Returns to the normal mode of operation.

20. SCOPE Screen

Displays digitized trace of specified signal.

B. SINAD METER

The SINAD Meter determines SINAD for a 1 kHz tone passed to the COM-120B through the specified Source. Information provided the user is displayed below:



00607051

1. Source

Displays selected source for SINAD Meter. Selections include AUDIO/DATA IN Connector and Scope/DVM Connector.

Soft Function Keys available with this function include:

F1 AUD/DAT
Selects AUDIO/DATA IN Connector as Source for SINAD Meter.

F2 SCP/DVM
Selects Scope/DVM Connector as Source for SINAD Meter.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

2. Range

Displays selected SINAD Meter Upper Range. Selections include Autorange, 15 dB and 30 dB.

Soft Function Keys available with this function include:

F1 15 dB
Selects 15 dB as active upper range for SINAD Meter.

F2 30 dB
Selects 30 dB as active upper range for SINAD Meter.

F3 AUTO
Selects Autorange as active upper range for SINAD Meter. This setting will automatically adjust to a higher or lower upper range if signal increases or decreases to a specified level of the current setting.

F5 RST PK
Resets Peak Readings displayed to 0.

F6 RETURN
Returns Test Set to Meters Menu.

3. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. Not valid in Autorange.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

4. Average

Displays current status of Averaging Function and number of samples when active. Status is Off or On. Range of samples is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

5. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range of value is 0 to 30 dB.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

6. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range of value is 0 to 30 dB.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

7. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, alarm sounds when signal exceeds Upper Limit (5) or is below Lower Limit (6).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

8. High-Pass Filter (HPF)

Displays current High-Pass Filter setting for SINAD Meter.

High-Pass Filter/Low-Pass Filter combination and Bandpass filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets High-Pass Filter to OFF, deactivating all high-pass filters.

F2 300 Hz
Activates 300 Hz High-Pass Filter.

F3 4 kHz
Activates 4 kHz High-Pass Filter.

F6 RETURN
Returns Test Set to Meters Menu.

9. Low-Pass Filter(LPF)

Displays current Low-Pass Filter setting for SINAD Meter.

High-Pass Filter/Low-Pass Filter combination and Bandpass filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Low-Pass Filter to OFF, deactivating all low-pass filters.

F2 300 Hz
Activates 300 Hz Low-Pass Filter.

F3 4 kHz
Activates 4 kHz Low-Pass Filter.

F4 20 kHz
Activates 20 kHz Low-Pass Filter.

F6 RETURN
Returns Test Set to Meters Menu.

10. Bandpass Filter (BPF)

Displays current Bandpass Filter setting for SINAD Meter.

High-Pass Filter/Low-Pass Filter combination and Bandpass filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF, deactivating all bandpass filters.

F2 C-MSG
Activates C-Message Weighted Bandpass Filter.

F6 RETURN
Returns Test Set to Meters Menu.

11. Lower Limit Bar

Indicates position of Lower Limit (6) on Bar Meter (12). If LOWER LIMIT (6) exceeds RANGE (2), marker is not visible.

12. Bar Meter

Relative Graphic display of current SINAD Meter reading.

13. Upper Limit Bar

Indicates position of Upper Limit (5) on Bar Meter (12). If Upper Limit (5) exceeds RANGE (2), marker is not visible.

14. Upper Range Limit Readout

Displays current value of Range (2). Redefined as needed if Autorange function is active.

15. Digital Readout

Displays current SINAD Meter Reading.

16. Peak Readings

Displays current high and low Peak Readings when Peak Hold (3) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

17. Scope Scale

Displays selected scale for Oscilloscope. Selections change depending on selected Source (1). Selections include:

Source (1)	Scale
AUD/DAT	100, 200, 500 mV, 1, 2, 5 V
SC/DVM	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div

Soft Function Keys available with this function include:

F1 MENU
Displays selections for Oscilloscope Scale. Soft Function Keys available with this function include:

F6 RETURN
Returns Test Set to SINAD Meter Screen.

18. Scope Sweep

Displays selected Oscilloscope Sweep time per division. Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

Soft Function Keys available with this function include:

F1 MENU
Displays selections for Oscilloscope Sweep. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into SINAD Meter Screen.

F2 ROLL
Views the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.

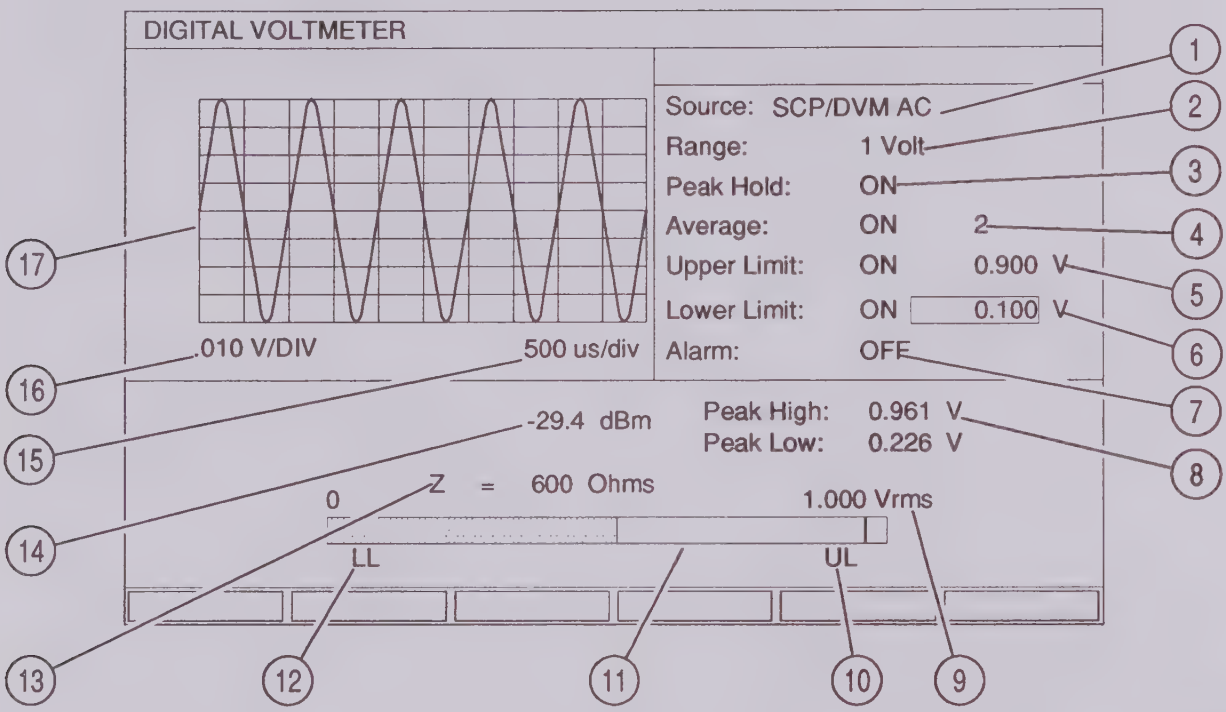
F2 SLOW
Returns to the normal mode of operation.

19. SCOPE Screen

Displays digitized trace of specified signal.

C. DIGITAL VOLTMETER

The Digital Voltmeter (DVM) measures voltage at the indicated Source. Units that are used are dependent on the selected Source (1). Information provided is displayed as follows:



00607052

1. Source

Displays selected source for Digital Voltmeter Meter. Selections include the following:

SCOPE/DVM Connector DC Coupled (SC/DVM DC)
SCOPE/DVM Connector AC Coupled (SC/DVM AC)
SCOPE/DVM Connector GND Coupled (SC/DVM GND)
AUDIO/DATA IN Connector (AUDIO/DATA IN)
EXT MOD IN Connector (EXT MOD IN)

Soft Function Keys available with this function include:

F1 MENU
Displays selections for DVM Source.

F6 RETURN
Returns Test Set to Digital Voltmeter Screen.

F3 DC ZERO
Zeroes reading to indicate 0 Vdc reading when selected Source is SCP/DVM DC.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

2. Range

Displays selected DVM Upper Range. Selections depend on Source (1). Selections include:

50 mV	100 mV	200 mV
500 mV	1 Volt	2 Volts
5 Volts	10 Volts	20 Volts
50 Volts	100 Volts	200 Volts

Soft Function Keys available with this function include:

F1 MENU
Displays selections for DVM Range. Soft Function Keys available with this function include:

F6 RETURN
Returns Test Set to Digital Voltmeter Screen.

F5 RST PK
Resets Peak Readings displayed.

F6 RETURN
Returns Test Set to Meters Menu.

3. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

4. Average

Displays current status of Averaging Function and number of samples when active. Status is Off or On. Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

5. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range of value is 0 to 200 Volts depending on Source (1).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

6. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range of value is 0 to 200 Volts depending on Source (1).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

7. ALARM

Displays current status of Alarm Function. Status is OFF or ON. When ON, alarm sounds when signal exceeds Upper Limit (5) or is below Lower Limit (6).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

8. Peak Readings

Displays current high and low Peak Readings when Peak Hold (3) is set to ON. Readings are reinitialized whenever RST PK Soft Function Key F5 is pressed.

9 Upper Range Limit Readout

Displays value of Range (2). Units are redefined as needed to match Source (1).

10. Upper Limit Bar

Indicates position of Upper Limit (5) on Bar Meter (11). If Upper Limit (5) exceeds Range (2), marker is not visible.

11. Bar Meter

Relative Graphic display of current Meter reading.

12. Upper Limit Bar

Indicates position of Lower Limit (6) on Bar Meter (11). If Lower Limit (6) exceeds Range (2), marker is not visible.

13. Impedance

Sets impedance of input signal for measuring Reading (14) in dBm. Not visible with Reading (14) set for other units. Range is 2 to 1000 Ω.

14. Reading

Displays current Reading in units specified by Source (1). Units for SC/DVM DC and SC/DVM GND are Volts; all other Sources (1) are Vrms, dB or dBm. Reading in dBm is referenced to Impedance (13).

Soft Function Keys available with ac-coupled sources include:

F1 Vrms
Selects Vrms for Reading Units.

F2 dBm
Selects dBm for Reading Units. Activates Impedance field.

F3 dB
Selects dB for Reading Units.

F6 RETURN
Returns Test Set to Meters Menu.

15. Oscilloscope Sweep

Displays selected Oscilloscope Sweep time per division. Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

Soft Function Keys available with this function include:

F1 MENU
Displays selections for Sweep.

Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into Digital Voltmeter Screen.

F2 ROLL
Views the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.

F2 SLOW
Returns to the normal mode of operation.

16. Oscilloscope Scale

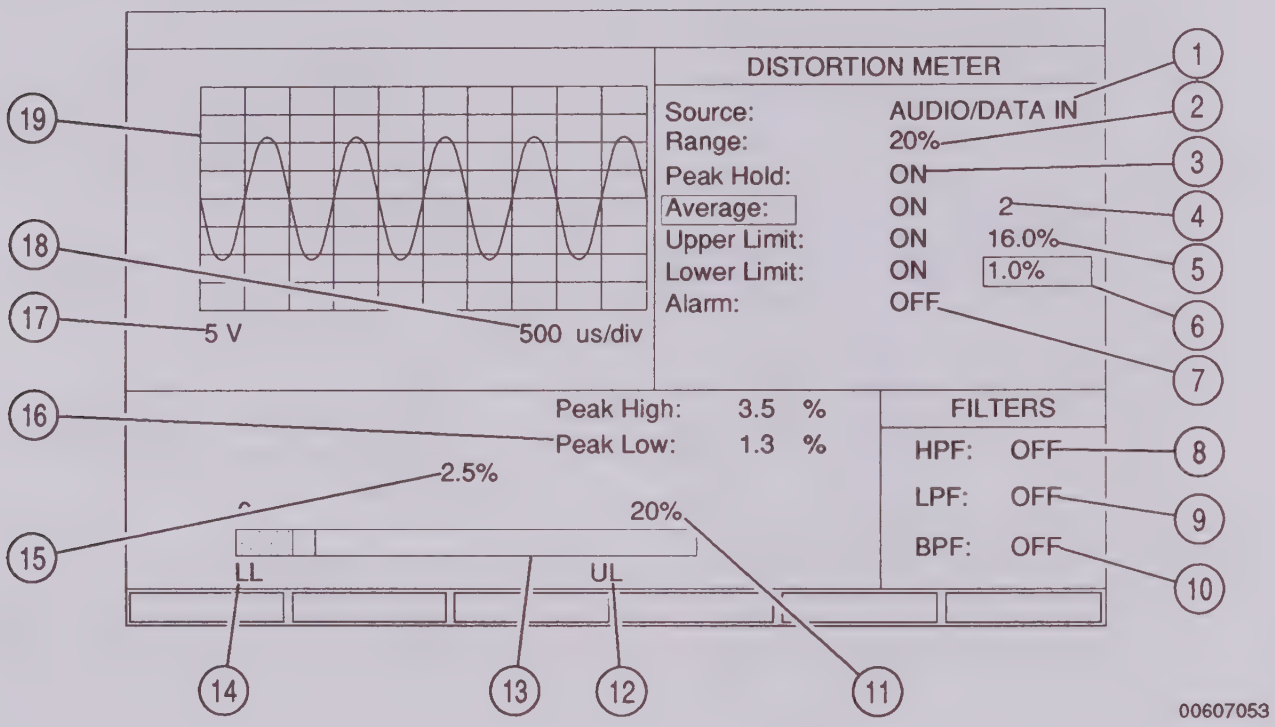
Displays Oscilloscope Vertical Scale. Scale is changed when Range is changed.

17. Oscilloscope Screen

Displays digitized trace of specified signal.

D. DISTORTION METER

The Distortion Meter determines Distortion for a 1 kHz tone passed to the COM-120B through the specified Source. Information provided is displayed below:



1. Source

Displays selected source for Distortion Meter. Selections are AUDIO/DATA IN Connector and SCOPE/DVM Connector.

Soft Function Keys available with this function include:

F1 AUD/DAT
Selects AUDIO/DATA IN Connector as Source for Distortion Meter.

F2 SCP/DVM
Selects SCOPE/DVM Connector as Source for Distortion Meter.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

2. Range

Displays Distortion Meter Upper Range of 20%. Field is for display only.

3. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

4. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Range of samples is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

5. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range of value is 0% to 20%.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

6. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range of value is 0% to 20%.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

7. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (5) or is below Lower Limit (6).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

8. High-Pass Filter (HPF)

Displays current High-Pass Filter setting.

High-Pass Filter/Low-Pass Filter combination and Bandpass filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets High-Pass Filter to OFF, deactivating all high-pass filters.

F2 300 Hz
Activates 300 Hz High-Pass Filter.

F3 4 kHz
Activates 4 kHz High-Pass Filter.

F6 RETURN
Returns Test Set to Meters Menu.

9. Low-Pass Filter (LPF)

Displays current Low-Pass Filter setting.

High-Pass Filter/Low-Pass Filter combination and Bandpass filter cannot be active simultaneously.

Soft Function Keys Available with this function include:

F1 OFF
Sets Low-Pass Filter to OFF, deactivating all low-pass filters.

F2 300 Hz
Activates 300 Hz Low-Pass Filter.

F3 4 kHz
Activates 4 kHz Low-Pass Filter.

F4 20 kHz
Activates 20 kHz Low-Pass Filter.

F6 RETURN
Returns Test Set to Meters Menu.

10. Bandpass Filter (BPF)

Displays current Bandpass Filter setting.

High-Pass Filter/Low-Pass Filter combination and Bandpass filter cannot be active simultaneously.

Soft Function Keys Available with this function include:

F1 OFF
Sets Bandpass Filter to OFF, deactivating all bandpass filters.

F2 C-MSG
Activates C-Message Weighted Bandbass Filter.

F6 RETURN
Returns Test Set to Meters Menu.

11. Upper Range Limit Readout

Displays current value of RANGE (2). Redefined as needed if Autorange function is active.

12. Upper Limit Bar

Indicates position of UPPER LIMIT (5) on Bar Meter (13). If UPPER LIMIT (5) exceeds RANGE (2), marker is not visible.

13. Bar Meter

Relative Graphic display of current Distortion Meter reading.

14. Lower Limit Bar

Indicates position of Lower Limit (6) on Bar Meter (13). If Lower Limit (6) exceeds Range (2), marker is not visible.

15. Digital Readout

Displays current Distortion Meter Reading.

16. Peak Readings

Displays current high and low Peak readings when Peak Hold (3) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

17. Scope Scale

Displays selected scale for Oscilloscope. Selections change depending on selected Source (1). Selections include:

Source (1)	Scale
AUD/DAT	100, 200, 500 mV, 1, 2, 5 V
SC/DVM	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div

Soft Function Keys available with this function include:

F1 MENU
Displays selections for Scope Scale. Soft Function Keys available with this function include:

F6 RETURN
Returns Test Set to Distortion Meter Screen.

18. Scope Sweep

Displays selected Oscilloscope Sweep time per division. Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200ms/div	500 ms/div

Soft Function Keys available with this function include:

F1 MENU
Displays selections for Oscilloscope Sweep. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into Distortion Meter Screen.

F2 ROLL
Views the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.

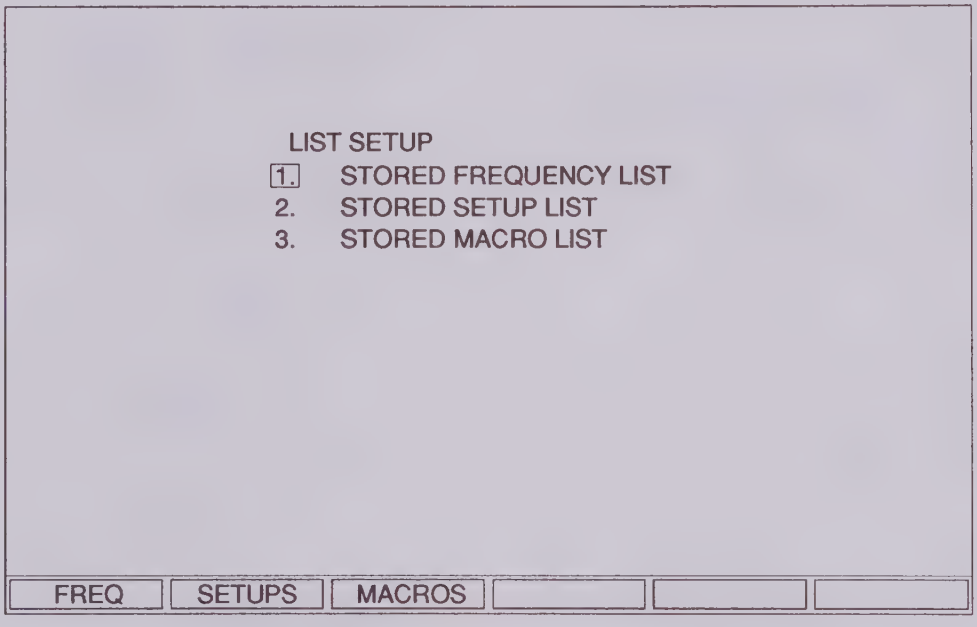
F2 SLOW
Returns to the normal mode of operation.

19. SCOPE Screen

Displays digitized trace of specified signal.

3-3-8 MEMORY LISTS AND STORAGE OF PARAMETERS

The COM-120B offers two ways to use memory to store parameters. First, the operator can make a Frequency List, specifying a frequency for Generating, a frequency for Receiving and an Offset for Duplex. Secondly, the user can store all parameters of RF Generate, RF Receive and Duplex Operation Screens, including supporting meters and operation screens in a Setup List. These Lists are accessable from a List Setup Screen. The List Setup Screen can be accessed by pressing the SHOW LIST Memory Key.



00607069

List Setup Menu

From the List Setup Menu, the Stored Frequency List and the Stored Setup List can be accessed by placing cursor on desired location and pressing ENTER Key.

Soft Function Keys available with this function include:

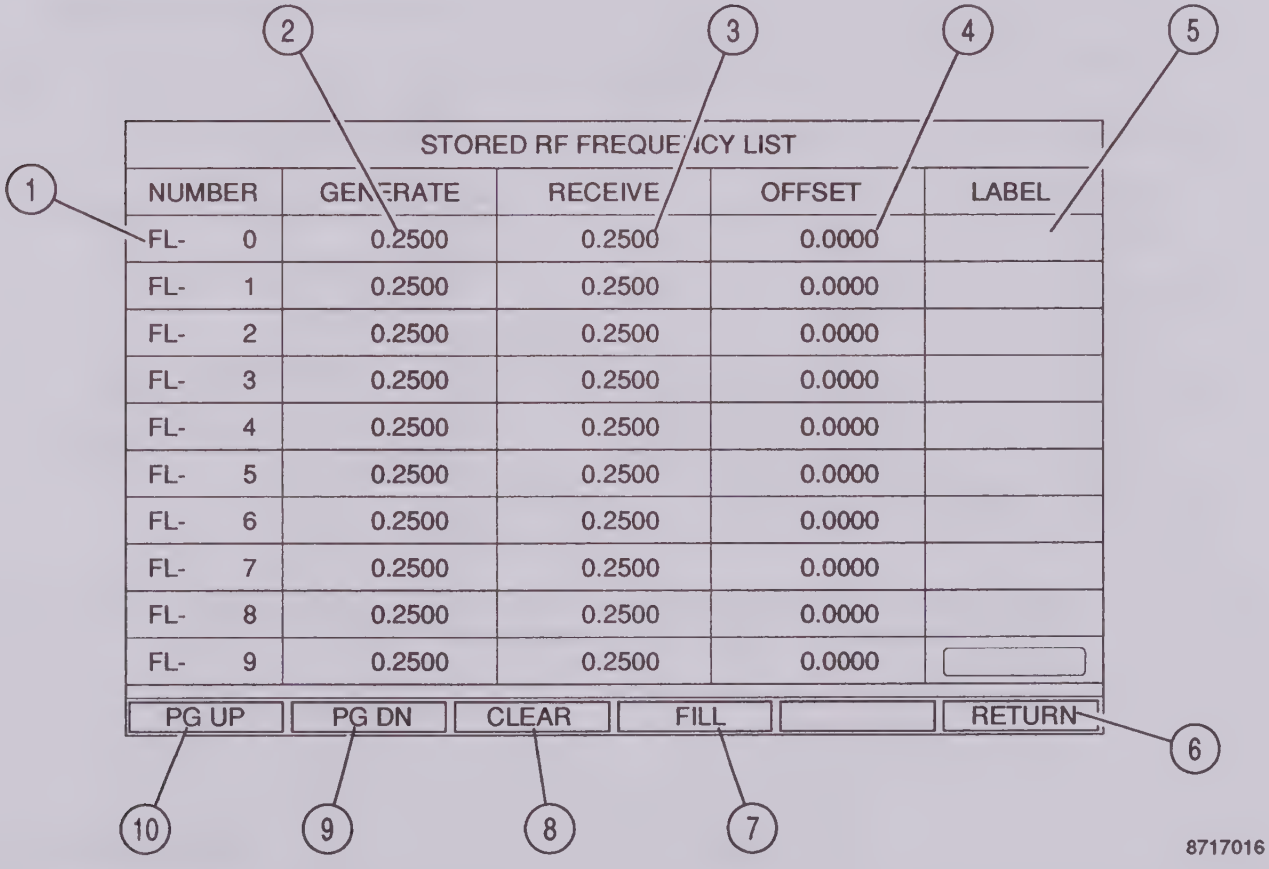
F1 FREQ
Displays the Stored RF Frequency List.

F2 SETUPS
Displays the Stored Test Setups.

F3 MACROS
Displays a list of all the Stored Macros.

A. STORED FREQUENCY LIST

Accessing the Stored Frequency List accesses a screen similar to the following. All edits to the Frequency List are made from this screen. The cursor can move to any frequency or label field. Up to 100 Frequency List entries (0-99) can be used for entering a Generate frequency, a Receive frequency and a Duplex Offset. Accessing a Frequency List Parameter from the RF Generate Operation Screen affects only that screen. The same is true for the RF Receive Operation Screen. Accessing a Frequency List Parameter from any Duplex Operation Screen activates the Generate Frequency, the Receive Frequency and the Offset. Whenever used, the Label also is activated for any Operation Screen. Features and Editable Parameters of the Stored Frequency List are as follows:



8717016

1. Frequency List Number

Displays Frequency List Number used to identify specified Generate Frequency (2), Receive Frequency (3) and Offset (4). Frequency List Numbers available include 0 to 99 with 10 displayed.

2. Generate Frequency

Displays Generate Frequency. Selections range from 0.0000 to 1000.0000 MHz.

3. Receive Frequency

Displays Receive Frequency. Selections range from 0.0000 to 1000.0000 MHz.

4. Offset

Displays Duplex Offset. Selections range from 0.0000 to 1000.0000 MHz.

5. Label

Displays optional Label associated with current Frequency List. Label consists of seven characters maximum.

6. RETURN Soft Function Key F6

Returns COM-120B to List Setup Menu.

7. FILL Soft Function Key F4

Accesses window for setting Fill range. Pressing EXEC Soft Function Key F5 Fills specified range of Offset Column with value where cursor is located. Visible only with cursor located on Offset (4). Pressing ESCAPE Soft Function Key F6 escapes edit without change.

Soft Function Keys available with this function include:

F5 EXEC
Executes Fill Function over specified range.

F6 ESCAPE
Escapes edit without change.

8. CLEAR Soft Function Key F3

Clears label location where cursor is located. Visible only with cursor located on Label (5).

9. PG DN Soft Function Key F2

Pages down to next page of Frequency List.

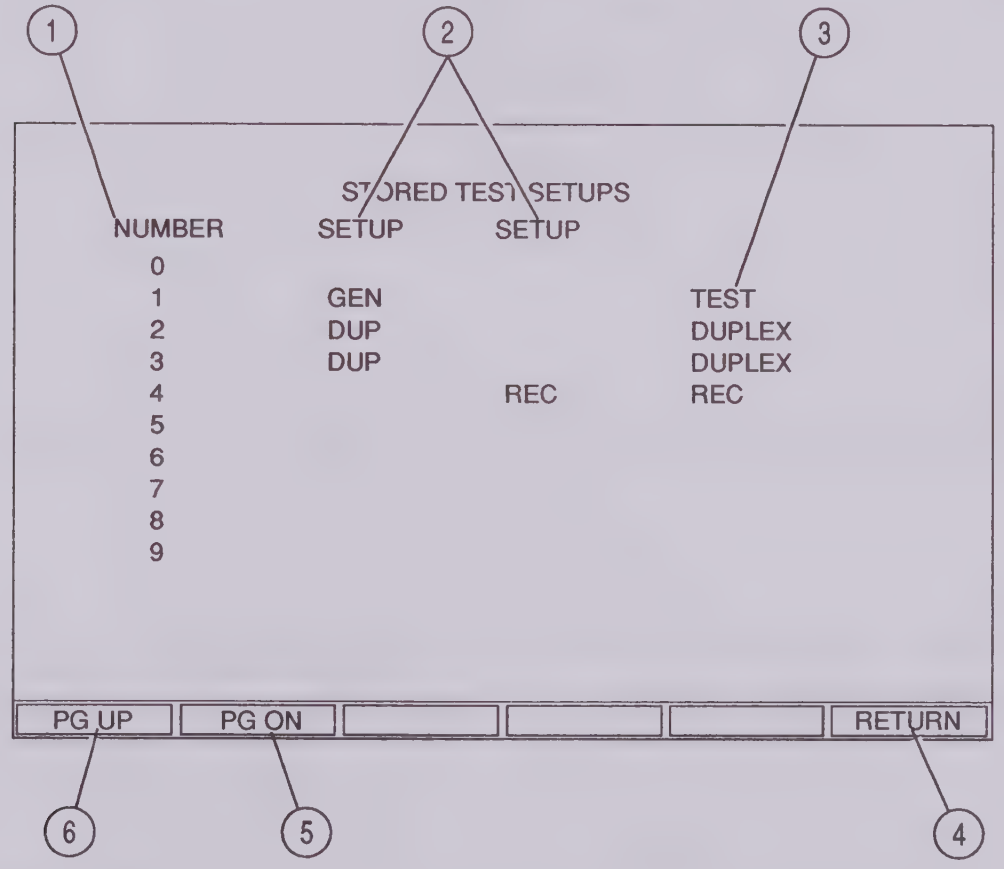
10. PG UP Soft Function Key F1

Pages up to previous page of Frequency List.

B. STORED SETUP LIST

Accessing the Stored Setup List displays a screen similar to the following. No edits to the Stored Setup List are made from this screen. The Stored Setup List displays Stored Setups by List Number Setup Type and an optional Label. Store up to 50 Setups of RF Generate Operation Screen, RF Receive Operation Screen or the Duplex Operation Screens. Parameters of the Operation Screens and all selected meters are stored for future recall.

Features of the Stored Setup List are as follows:



8717097

1. Setup List Number

Displays Setup List Number used to identify specified Setup Type (2) and Label (3). Frequency List Numbers available include 0 to 49 with 10 displayed.

2. Setup Type

Displays operation type stored at specified location. Selections include GEN (RF Generate Operation Screen), DUP (Duplex Operation Screen) and REC (RF Receive Operation Screen).

3. Label

   Displays optional Label associated with Setup. Label can consist of seven characters maximum.

4. RETURN Soft Function Key F6

   Returns COM-120B to List Setup Menu.

5. PG DN Soft Function Key F2

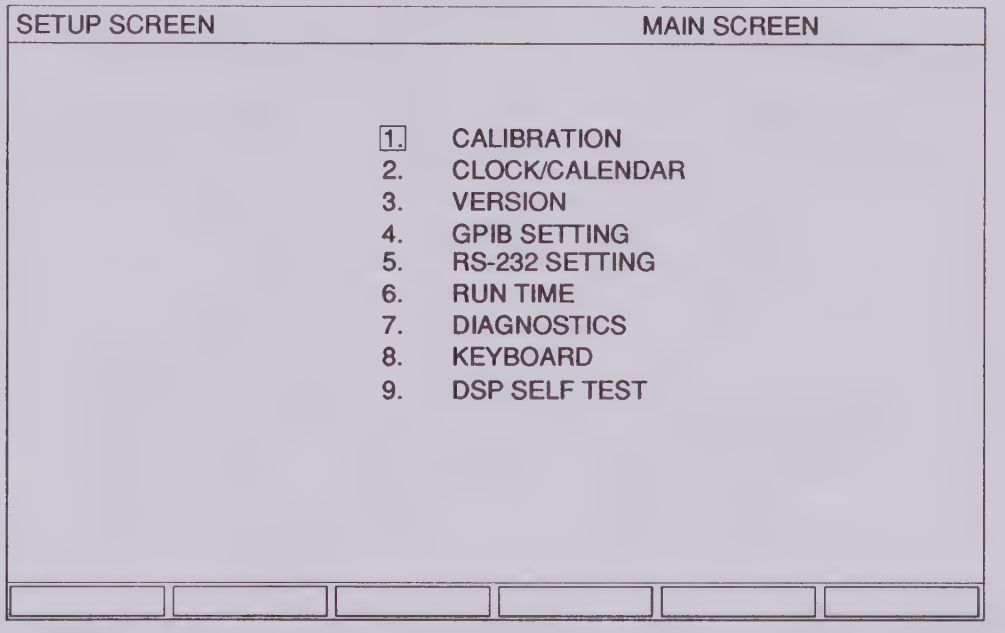
   Pages down to next page of Stored Setup List.

6. PG UP Soft Function Key F1

   Pages up to next page of Stored Setup List.

3-3-9 UTILITY FUNCTIONS

The Setup Screen allows access to system configuration and provides information on system status. The Setup Screen is accessed by pressing SETUP Memory Key. Selections are made by placing cursor on desired subject and pressing the ENTER Key.



00607054

Setup Screen

Each of the selections of the Setup Screen access another screen for performing the required function. The Calibration selection is under password security and is not covered in this manual. The other selections are covered in the following sections:

A. Clock/Calender Screen

B. Software Version Screen

C. GPIB Configuration Screen (Option 13)

D. RS-232 Configuration Screen

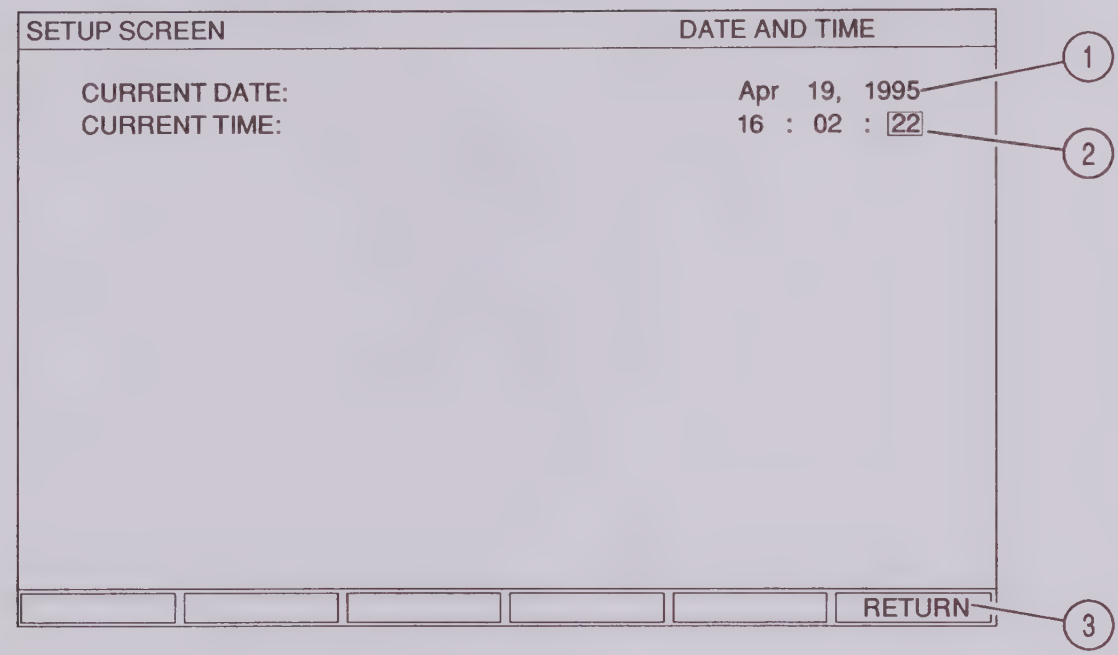
E. Run Time Screen

F. System Diagnostics Menu

G. Keyboard Setup Screen

A. CLOCK/CALENDER SCREEN

The Clock/Calender Screen is used to set the Date and Time for the COM-120B. Features and editable parameters are shown below.



00607055

1. Date Field

   Sets date in month, day and year format. Each section is edited separately.

2. Time Field

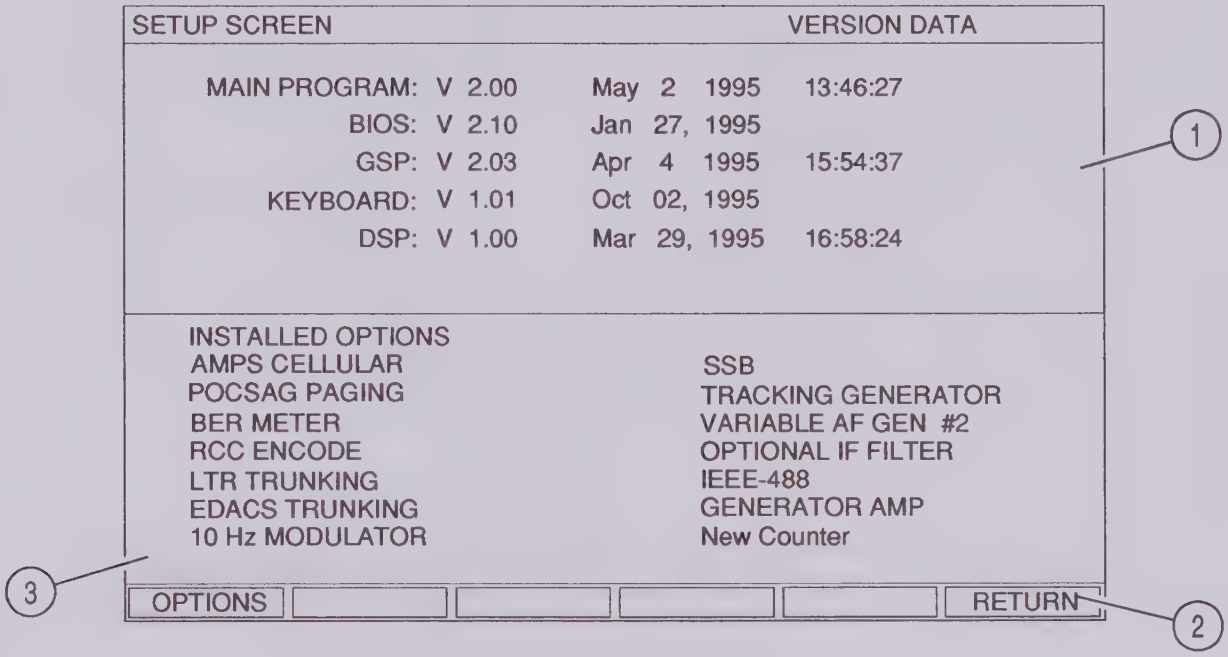
   Sets time in 24 hour format. Sets time in hours, minutes and seconds. Each section is edited separately.

3. RETURN Soft Function Key F6

   Returns operation to Setup Screen.

B. SOFTWARE VERSION SCREEN

The Software Version Screen is used to report the current version of programmed devices for the COM-120B as well as display installed options. Features and editable parameters are shown below.



00607056

1. Version Data

   Displays Software Version of the programmed devices in the COM-120B.

2. RETURN Soft Function Key F6

   Returns operation to Setup Screen.

3. OPTIONS Soft Function Key F1

   Reveals a pop up window that allows the entry of option codes to enable specific options.

   For additional option code information contact:

   IFR Systems, Inc.
   Customer Service Dept.
   10200 W. York
   Wichita, Kansas 67215

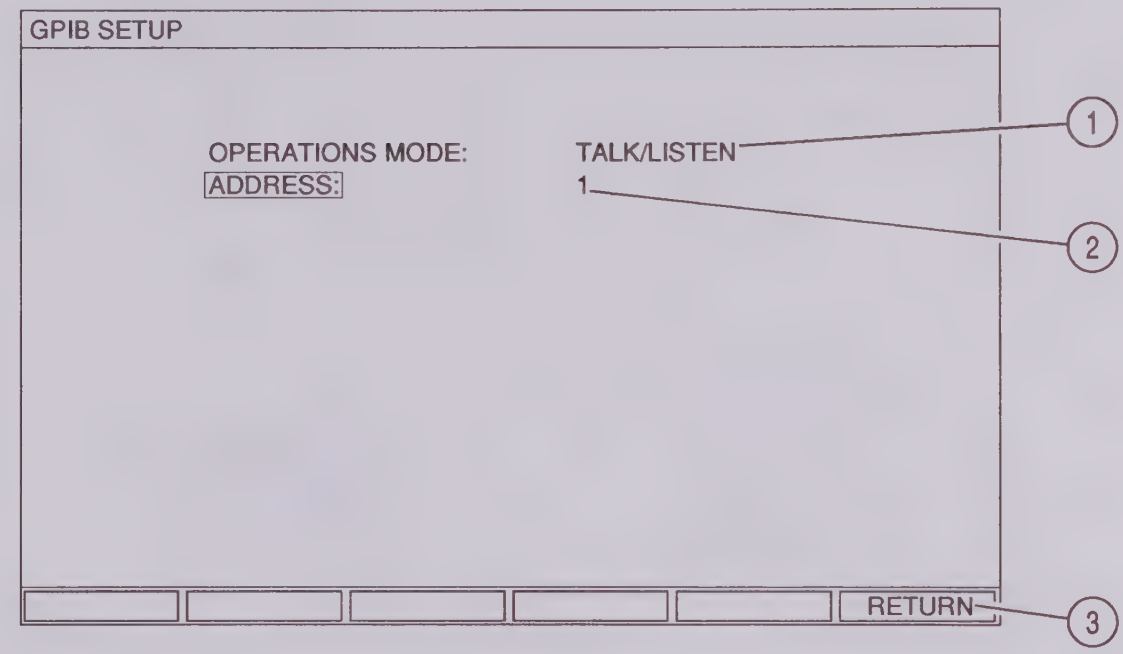
   Telephone: 800-835-2350
   FAX: 316-524-2623

4. Installed Options

   Displays list of options installed in unit.

C. GPIB CONFIGURATION SCREEN (OPTION 13)

The GPIB Configuration Screen is used to configure the GPIB Connector Protocol for the COM-120B. Features and editable parameters are shown below.



8717030

1. Operations Mode

   Displays selected Mode of Operation for GPIB Operation. Selections include TALK/LISTEN, TALK ONLY and LISTEN ONLY.

2. Address

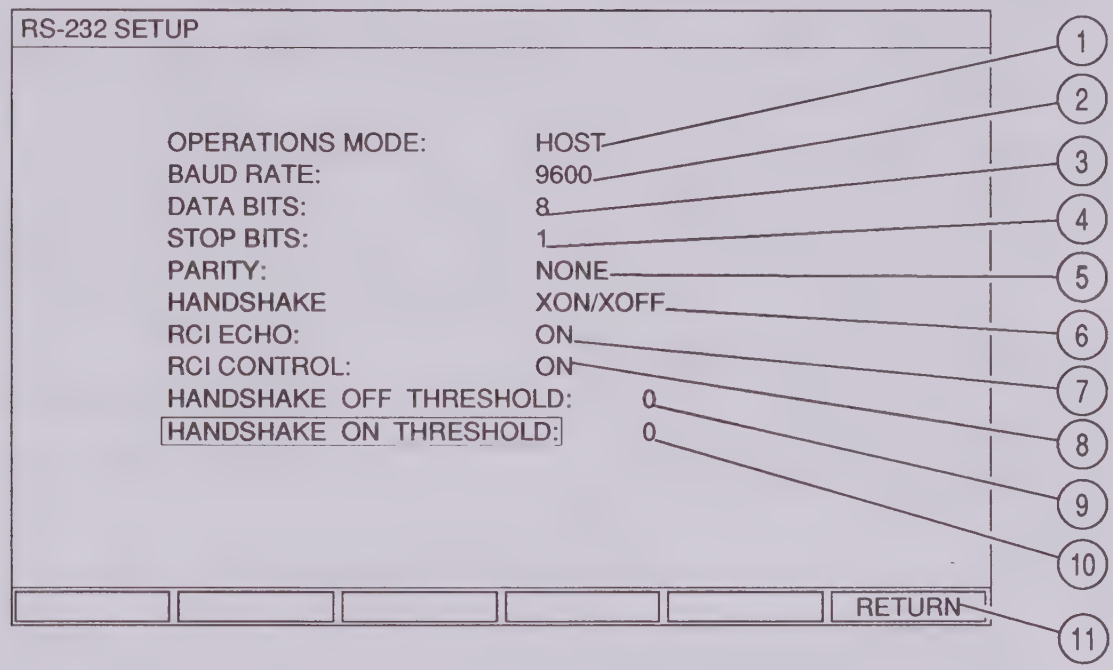
   Displays selected Address GPIB Operation. Selections range from 1 to 30.

3. RETURN Soft Function Key F6

   Returns operation to Setup Screen.

D. RS-232 CONFIGURATION SCREEN

The RS-232 Configuration Screen is used to configure the RS-232 Connector Protocol for the COM-120B. Features and editable parameters are shown below.



8717029

1. Operations Mode

   Displays selected Mode of Operation for RS-232 Operation. Selections include HOST and OFF.

2. BAUD RATE

   Selects BAUD Rate for data transfer through RS-232. Selections include:

110	150	300
600	1200	2400
4800	9600	19.2K
38.4K		

3. Data Bits

   Displays selected number of Data Bits. Selections include 7 and 8.

4. Stop Bits

   Displays selected number of Stop Bits. Selections include 1 and 2.

5. Parity Bits

   Displays selected Parity. Selections include NONE, EVEN and ODD.

6. Handshake

   Displays selected Handshake protocol. Selections include NONE, CTS, XON/XOFF and CTS/RTS.

7. RCI Echo

   Displays whether unit will echo characters back to remote control system over RS-232 interface. Displays ON or OFF.

8. RCI Control

   Displays whether unit will respond to commands from remote control system. Displays ON or OFF. This field controls both GPIB and RS-232 Remote Control.

9. HANDSHAKE OFF THRESHOLD

   Displays selected value used to "tune" remote interface for data transfer. RS-232 buffer is 2 kbytes. When number of bytes remaining to fill buffer reaches selected value, Test Set will send Handshake Off signal. Value default is 25 and range is 10 to 240.

10. HANDSHAKE ON THRESHOLD

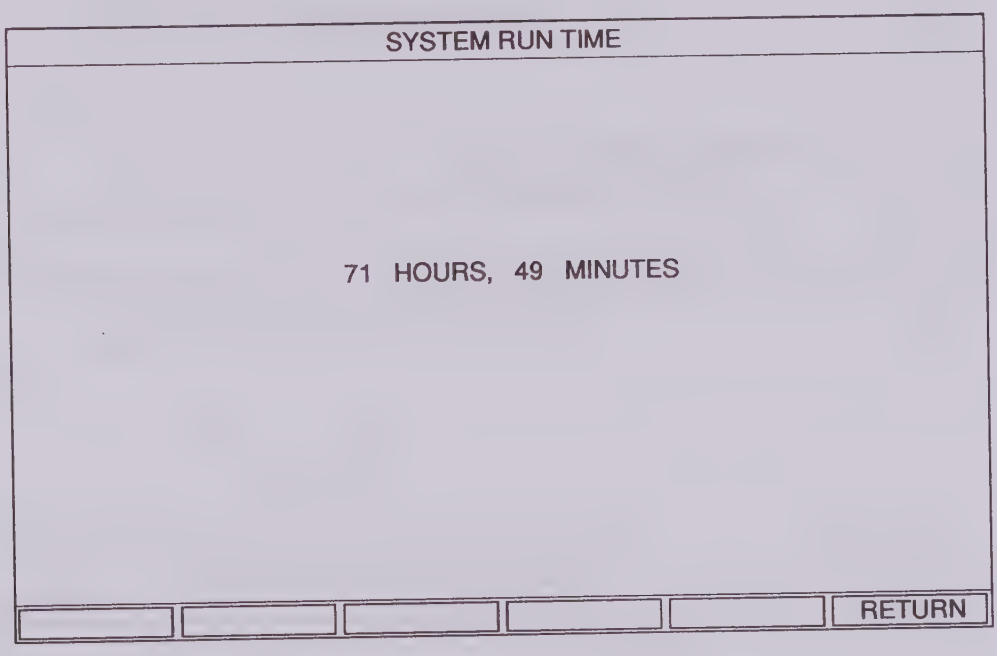
    Displays selected value used to "tune" remote interface for data transfer. When number of bytes remaining in buffer reaches selected value, Test Set will send Handshake On signal. Value default is 25 and range is 10 to 240.

11. RETURN Soft Function Key F6

    Returns operation to Setup Screen.

E. RUN TIME SCREEN

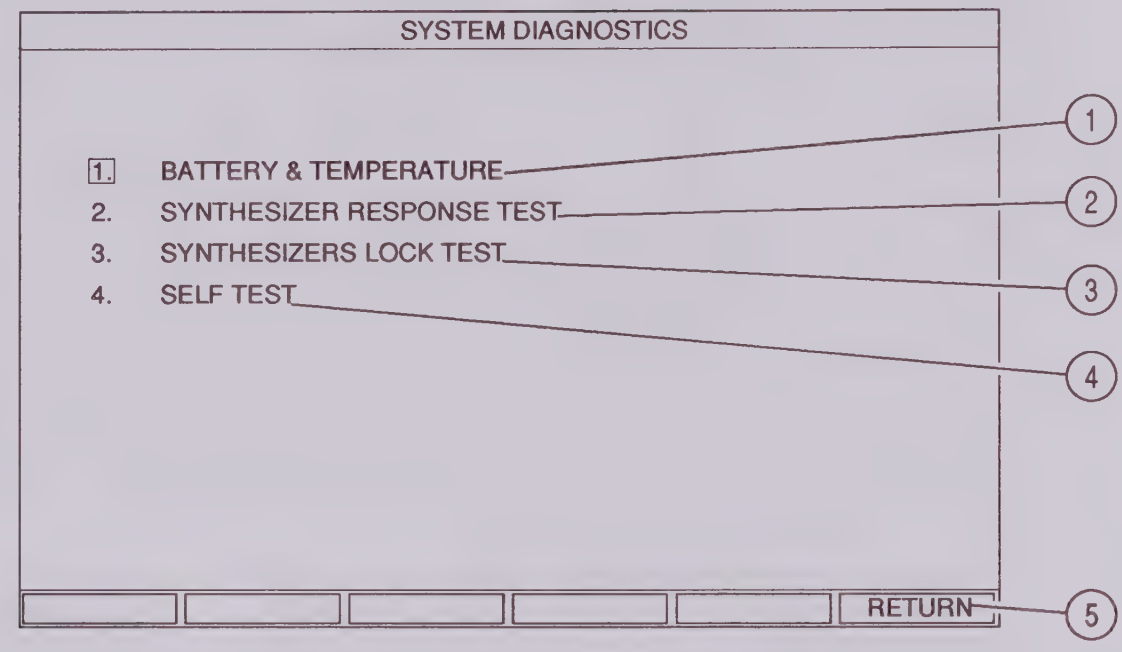
The Run Time Screen displays cumulative time spent in operation for the COM-120B. Time is displayed as shown below in Hours and Minutes. Pressing RETURN Soft Function Key F6 returns user to Setup Screen.



8717026

F. SYSTEM DIAGNOSTICS MENU

The System Diagnostics Menu displays a menu shown below for selecting a specific Diagnostics Screen:



8717027

1. Battery and Temperature

   Diagnostic Screen that Displays Battery voltage and Power Term Temperature.

2. Synthesizer Response Test

   Diagnostic Screen used to test Synthesizer Response.

3. Synthesizers Lock Test

   Diagnostic Screen used to display current status of synthesizers in the Test Set.

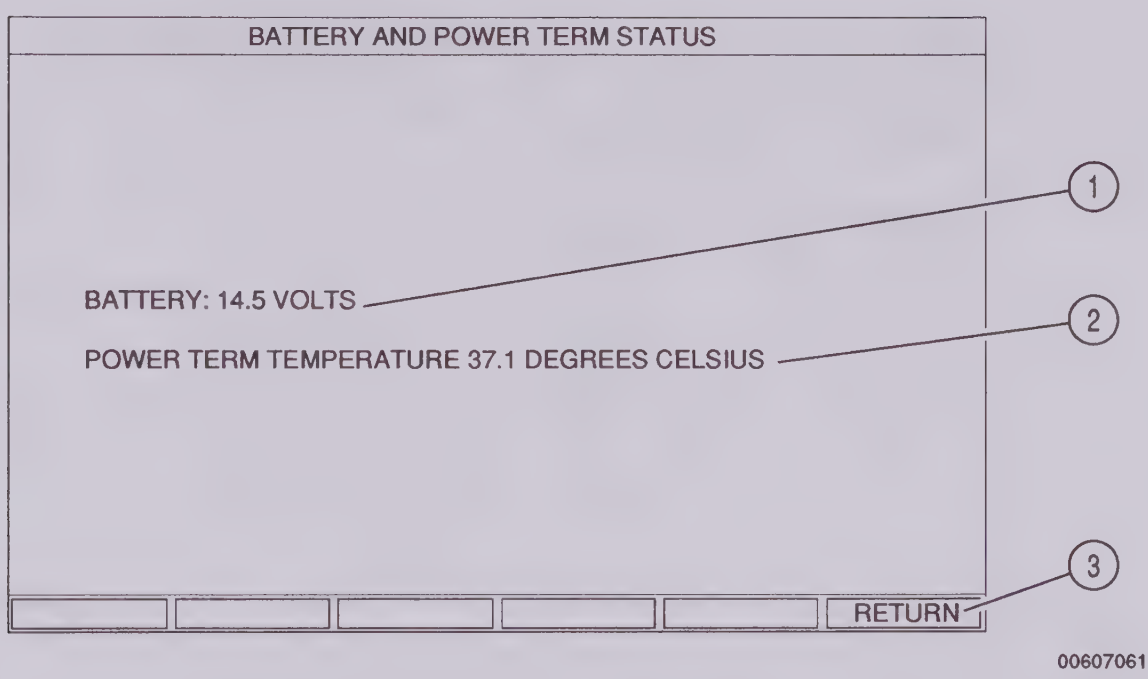
4. Self Test

   Diagnostic Screen for performing Self Test and reading results.

5. RETURN Soft Function Key F6

   Returns operation to Setup Screen.

Accessing Battery and Temperature
Screen displays the following screen.



1. BATTERY

   Displays Battery voltage.

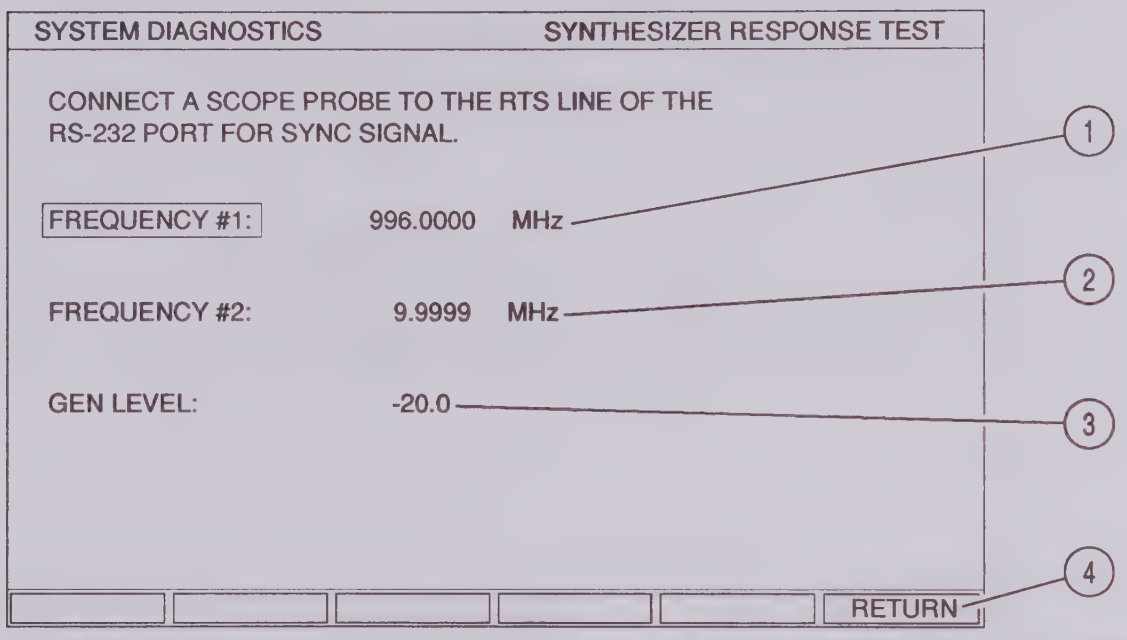
2. TEMPERATURE

   Displays Power Term Temperature in Degrees Celsius.

3. RETURN Soft Function Key F6

   Returns operation to System Diagnostics Screen.

Accessing Synthesizer Response Test displays the following screen.



00607062

1. FREQUENCY #1:

   Sets desired frequency to test Synthesizer to/from response.

2. FREQUENCY #2:

   Sets desired frequency to test Synthesizer to/from response.

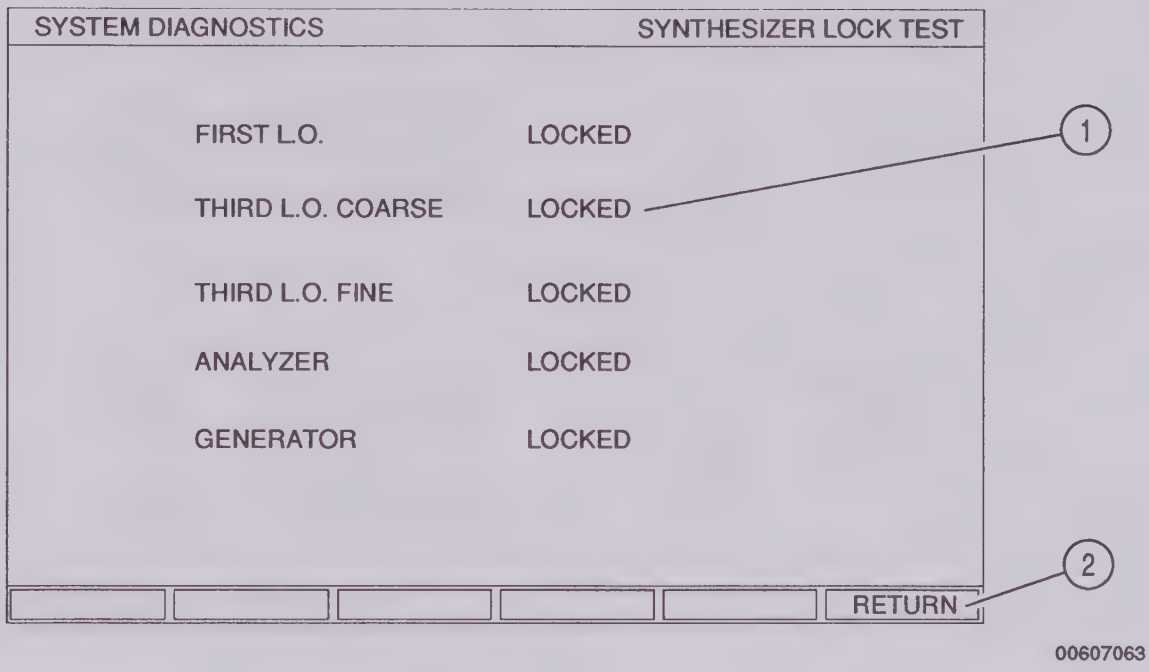
3. GEN LEVEL:

   Sets desired generate level.

4. RETURN Soft Function Key F6.

   Returns operation to System Diagnostics Screen.

Accessing the Synthesizers Lock Test Screen displays the current status of synthesizers in the Test Set.



1. FIRST L.O.

   Displays the First Local Oscillator in a LOCKED or UNLOCKED condition.

2. THIRD L.O. COARSE

   Displays the Third Local Oscillator Coarse in a LOCKED or UNLOCKED condition.

3. THIRD L.O. FINE

   Displays the Third Local Oscillator Fine in a LOCKED or UNLOCKED condition.

4. ANALYZER

   Displays the Analyzer in a LOCKED or UNLOCKED condition.

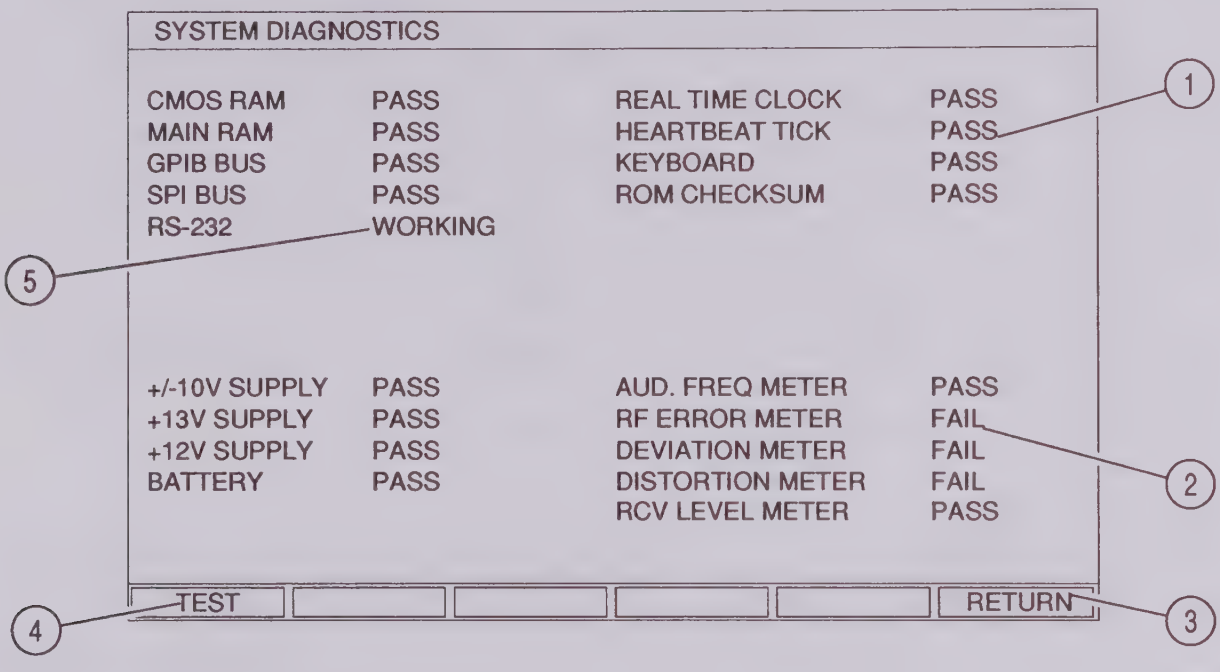
5. GENERATOR

   Displays the Generator in a LOCKED or UNLOCKED condition.

6. RETURN Soft Function Key F6

   Returns operation to System Diagnostics Screen

Accessing Self Test Diagnostics Screen displays the following screen. Each test is listed with a PASS/FAIL Indicator beside it. Self Test is performed at turning power on and when TEST Soft Function Key F1 is pressed. Self Test features are:



8717019

1. PASS Indication

   Indicates test passed when Self Test was performed.

2. FAIL Indication

   Indicates test failed when Self Test was performed.

3. RETURN Soft Function Key F6

   Returns operation to Setup Screen.

4. TEST Soft Function Key F1

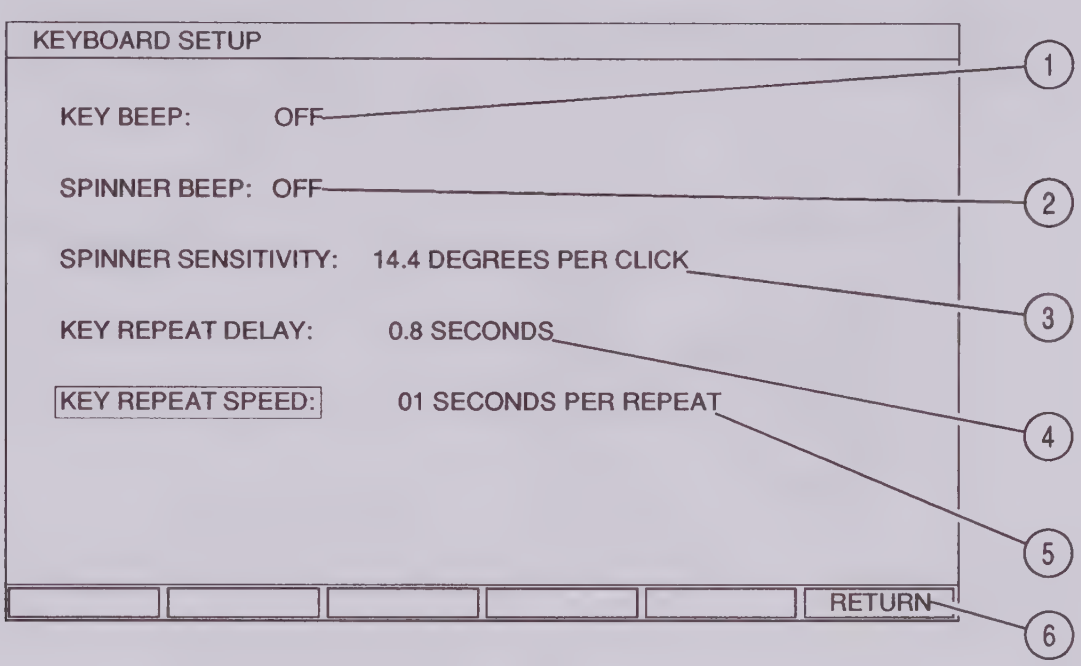
   Performs self test when pressed.

5. WORKING Indication

   Indicates test is currently being conducted.

G. KEYBOARD SETUP SCREEN

The Keyboard Setup Screen accesses operation parameters. Specific parameters are:



8717020

1. Key Beep

   Displays status of audible Key Beep. Displays ON or OFF.

2. Spinner Beep

   Displays status of audible Spinner Beep. Displays ON or OFF.

3. Spinner Sensitivity

   Displays turn amount for Spinner to change value. Range is 3.6 to 356.4 Degrees in 3.6 Degree steps. Entering 0 Degrees sets spinner to default of 14.4 Degrees.

4. Key Repeat Delay

   Displays Desired delay after key is pressed before Key function begins to repeat. Range is 0.1 to 25.5 sec. Entering 0 sets function to default of 0.8 sec.

5. Key Repeat Speed

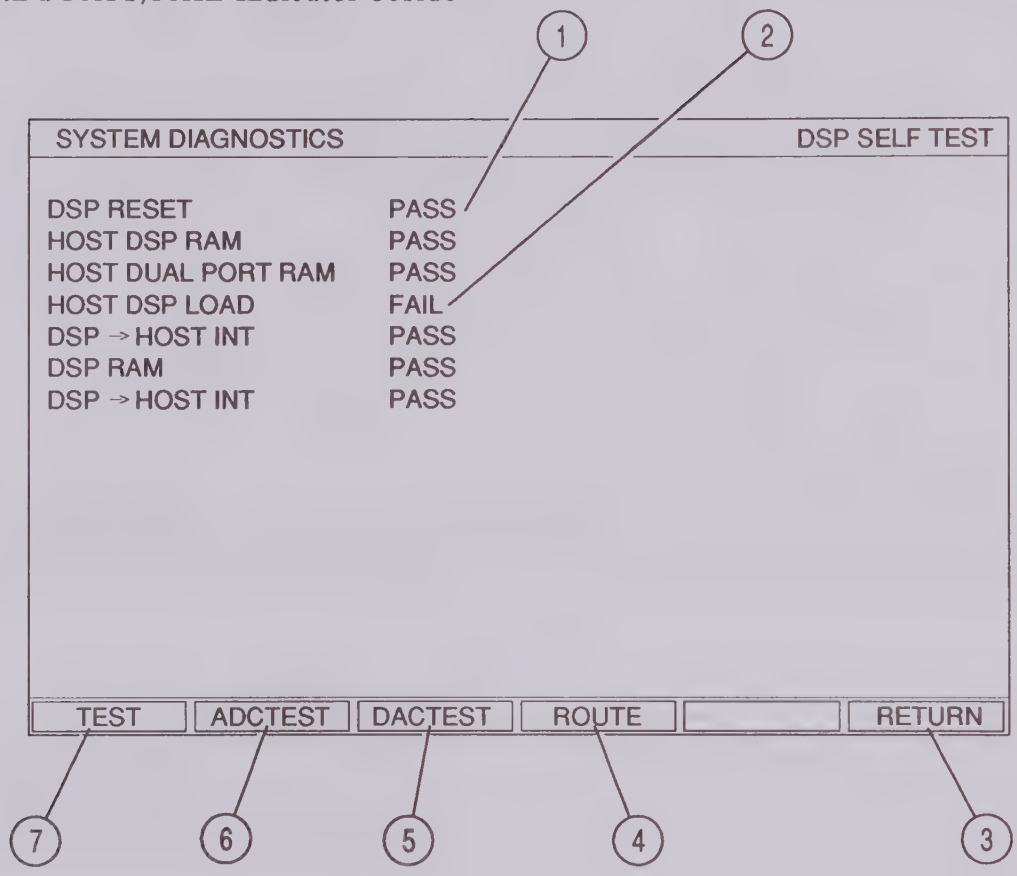
   Displays Key repeat Speed. Range is 0.1 to 25.5 sec. Entering 0 sets 0.1 sec default.

6. RETURN Soft Function Key F6

   Returns operation to Setup Screen.

H. DSP SELFTEST

The DSP Selftest Screen accesses a screen for performing selftests and reading results. Each test is listed with a PASS/FAIL Indicator beside it. Selftests are performed using the available Soft Function Keys described below.



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1. PASS Indication

   Indicates test passed when Self Test was performed.

2. FAIL Indication

   Indicates test failed when Self Test was performed.

3. RETURN Soft Function Key F6

   Returns operation to Setup Screen.

4. ROUTE Soft Function Key F4

   Routes the DSP input from the AUDIO/DATA IN to the AUDIO/DATA OUT.

5. DACTEST Soft Function Key F3

   Causes the DSP to generate a ramp function.

6. ADCTEST Soft Function Key F2

Causes the DSP to read from the A/D converter and send the data read to the D/A converter where the output is monitored. Behaves like a loopback test.

7. TEST Soft Function Key F1

Performs self test when pressed.

SECTION 4 - OPERATION

4-1 GENERAL NOTES ON OPERATION OF THE COM-120B

The following comments apply to all Operation Screens within the COM-120B. If operation in a particular field is different from what follows, it is discussed in detail within the procedure. Otherwise it is assumed that the operator has read these notes.

4-1-1 CURSOR MOVEMENT

A cursor, in the shape of a box, is used to identify what is currently editable. There are two methods to move the Cursor around the active screen. First the DATA SCROLL Keys are used as long as the current Cursor location is not currently being edited. The second method is to use the TAB Function as follows:

1. Press TAB Key.
2. Enter Value that appears in desired screen location using DATA ENTRY Key.
3. Press ENTER Key to complete operation.

4-1-2 EDITING FIELDS USING DATA SCROLL KEYS AND SPINNER

All fields can be edited using DATA SCROLL Keys and/or DATA SCROLL Spinner. Editing Numeric Data Fields is a special case and is covered in para 4-1-3. Edit the remainder of the fields using DATA SCROLL Keys and/or DATA SCROLL Spinner as follows:

1. Position cursor on field selected for edit using DATA SCROLL Keys or TAB Function.
2. Press ENTER Key to highlight field.
3. Press DATA SCROLL Key (↑) to move up through search field and DATA SCROLL Key (↓) to move down through search field. Alternate method is to use DATA SCROLL Spinner. Turning DATA SCROLL Spinner clockwise performs same operation as pressing DATA SCROLL Key (↑).
4. Press ENTER Key to complete operation.

4-1-3 EDITING NUMERIC DATA FIELDS

The primary method of editing data in numeric data fields such as frequencies and levels is to use DATA ENTRY Keys. The step-by-step procedure for this method is as follows:

1. Position cursor on field selected for data entry using DATA SCROLL Keys or TAB Function.
2. Enter numeric value using DATA ENTRY Keys.
3. Press ENTER Key to complete operation.

A second method to change current numeric values in small amounts is to use the DATA SCROLL Keys and/or DATA SCROLL Spinner. This method changes one digit of the value directly, but more significant digits are affected indirectly as the edited digit passes zero in either direction. The step-by-step procedure for this method is as follows:

1. Position cursor on field selected for data entry using DATA SCROLL Keys or TAB Key.

2. Press ENTER Key to highlight field.

3. Digit in field to be edited is not highlighted. Pressing DATA SCROLL Key (→) moves highlight to less significant digit. Pressing DATA SCROLL Key (←) moves highlight to more significant digit.

4. Once digit to be edited is selected, press DATA SCROLL Key (↑) to increase digit value and DATA SCROLL Key (↓) to decrease digit value. Alternate method is to use DATA SCROLL Spinner. Turning DATA SCROLL Spinner clockwise increases value and counterclockwise decreases value.

5. Press ENTER Key to complete operation.

4-1-4 MAKING SELECTIONS FROM MENUS

Whenever the number of selections for the position being edited exceeds the number of available Soft Function Keys, a MENU Soft Function Key is used. Pressing the MENU Soft Function Key opens a window of selections for the current cursor location. The window cursor is located at the currently active selection. To choose a different selection, move the cursor using the DATA SCROLL Keys or DATA SCROLL Spinner to the selection. Press the ENTER Key to complete the operation.

4-1-5 ESCAPING FROM EDIT WITHOUT CHANGE

An edit procedure can be exited at any time, without change, by pressing the ESC Key.

4-2 RF GENERATE OPERATION

Pressing the GEN MODE Key accesses the RF Generate Operation Screen. The purpose of the RF Generate Mode is for the COM-120B to act as a transmitter and test a receiver. This section provides information in configuring the COM-120B to perform tests on the receiver.

This section is provided to explain how each of the active fields are edited and what selections are available. It is not designed to perform a specific test, but instead is provided as a reference for operating the RF Generate Operation Screen. Below is a list of Operations available with the RF Generate Operation Screen:

4-2-1 RF Generate General Operation

4-2-2 Generating FM Modulated RF Signal

4-2-3 Generating AM Modulated RF Signal

4-2-4 Generating PM Modulated RF Signal

4-2-5 Generating DCS Coded RF Signal

4-2-6 Generating DTMF Coded RF Signal

4-2-7 Generating RF Signal Using External Modulation

4-2-8 Generating Microphone Modulated RF Signal

4-2-9 Measuring Receiver Center Frequency

4-2-10 Measuring Receiver Sensitivity

4-2-11 Measuring Receiver Selectivity

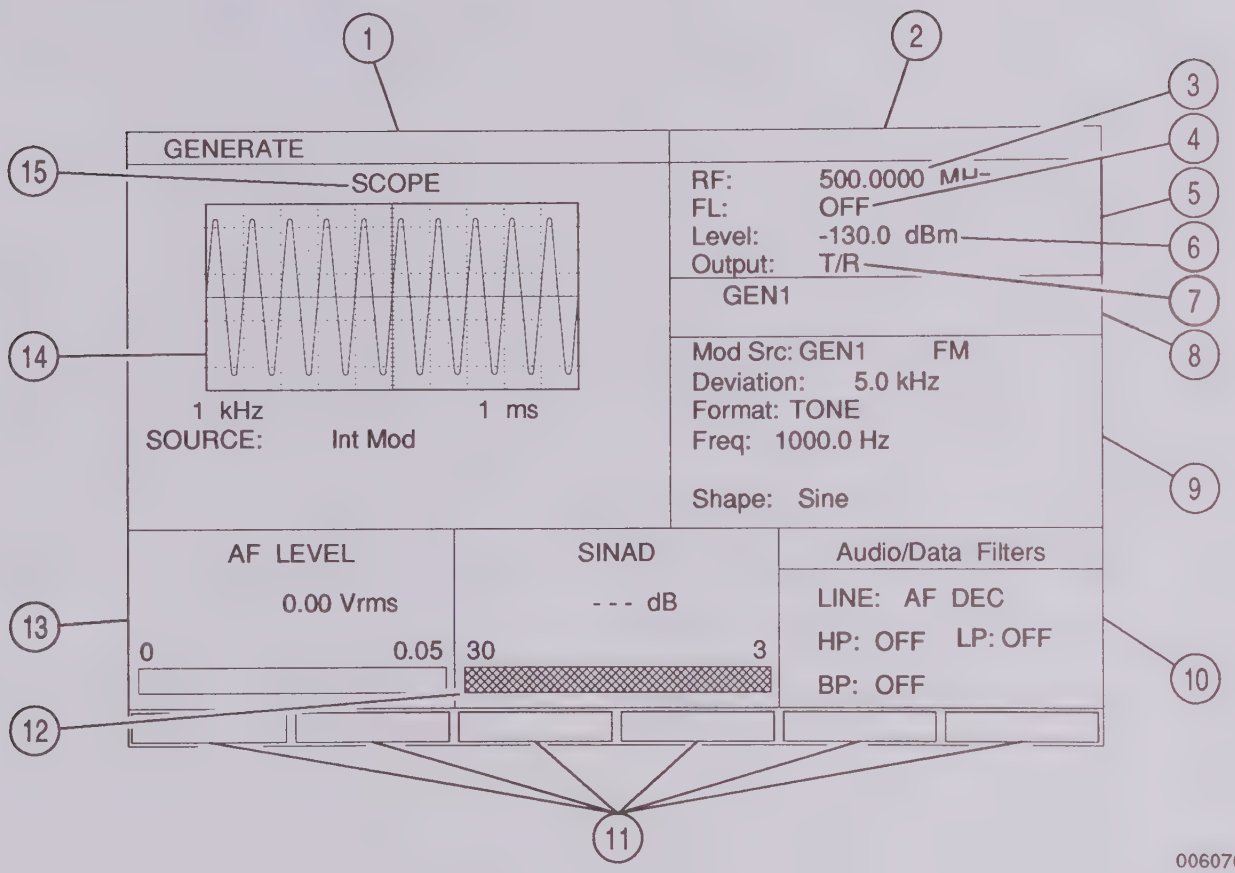
4-2-12 Measuring Receiver Audio Output Level

4-2-13 Measuring Modulation Acceptance Bandwidth

4-2-14 Measuring Receiver IF Bandwidth

4-2-1 RF GENERATOR GENERAL OPERATION

A. RF GENERATE GENERAL OPERATION SCREEN



RF Generator Operation Screen

1. Enter desired frequency in RF Field (2). Frequency range is .0000 to 1000 MHz. Activate additional functions as required as follows:

   - To operate with Δ Function active:
     - Press Δ On/Off Soft Function Key F2 until Δ prompt appears beside RF Field (2).
     - Δ= increment is accessed by pressing Δ= Soft Function Key F1, activating window to set RF Field (2) change increment. Range is 0 to 500 MHz. Press RETURN Soft Function Key F6 to close Change Window.
   - To deactivate Δ Function, press Δ On/Off Soft Function Key F2 until Δ prompt no longer appears beside RF Field (2).
   - To Operate with Set Reference Function, press SET REF Soft Function Key F3 until ***R*** appears beside RF Field (2). When active,

RF Field (2) is set to 0 MHz and changes made to RF Field (2) display offset from Reference Frequency. To deactivate Set Reference Function, press SET REF Soft Function Key until *R* is not visible.

- To Operate with Sweep Operation, press SWEEP Soft Function Key F4 to open Sweep Configuration Window. Once Sweep Configuration Window is opened:
  - Move Cursor to Start Field. Enter Start Frequency for Sweep Operation.
  - Move Cursor to Stop Field. Enter Stop Frequency for Sweep Operation.
  - Move Cursor to Increment Field. Enter Increment for Sweep Operation.
  - Move Cursor to Pause Time Field. Enter time to pause at each frequency.
  - If single sweep is desired, press SINGLE Soft Function Key F3. If continuous sweep is desired, press START Soft Function Key F1. To stop Sweep Function, press STOP Soft Function Key F2. To resume Sweep Operation once stopped, press RESUME Soft Function Key F5.
  - Press RETURN Soft Function Key F6 to exit Sweep Function.

Set Reference Function and Sweep Function cannot be active simultaneously.

- To Operate with RF Generate, RF Receive and Spectrum Analyzer RF Frequencies locked, press LOCK/UNLOCK Soft Function Key F5 until *L* is displayed beside RF Field and UNLOCK is displayed for F5 definition. Press UNLOCK Soft Function Key F5 to set LOCK Function to OFF.

2. If Frequency List Operation is desired instead of entering frequency in RF Field (2), select Frequency List (3) Setting as follows:
   - Select desired Frequency List (3) Type as follows:
     - Press T-Fwd Soft Function Key F2 to select Trunking Forward Channel List.
     - Press T-Rvs Soft Function Key F3 to select Trunking Reverse Channel List.
     - Press C-Fwd Soft Function Key F4 to select Cellular Forward Channel List.
     - Press C-Rvs Soft Function Key F5 to select Cellular Reverse Channel List.
     - Press FL Soft Function Key F6 to select User Defined Frequency List.
   - Press ON/OFF Soft Function Key F1 to active Frequency List (3) Setting.
   - If Cellular Channel List or User Defined Frequency List is selected, enter channel/frequency number. Range of cellular channels is 1 to 1023. Range of Frequency List is 0 to 99.
   - If Trunking Channel List is selected, select channel number. Select Frequency Band by moving cursor to Frequency Band Field

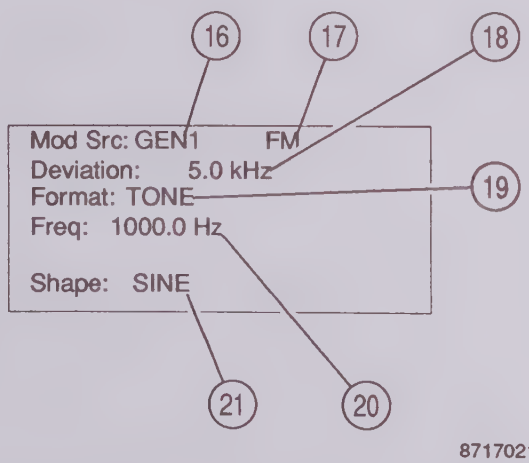
and pressing ENTER. Select desired Frequency Band using DATA SCROLL Keys or DATA SCROLL Spinner. Press ENTER Key.

3. Set Output Level (5) as follows:

   - Select Output Level Units as follows:
     - Press dBm Soft Function Key F1 to select dBm as Output Level Units.
     - Press uV Soft Function Key F2 to select µV as Output Level Units.
     - Press mV Soft Function Key F3 to select mV as Output Level Units.
     - Press V Soft Function Key F4 to select V as Output Level Units.
   - Once Output Level Units are selected, select Output Level.
   - To operate with SINAD Search Function:
     - Press SINAD= Soft Function Key F5 to access field to set SINAD Search Function value. Range of SINAD = is 6 to 30 dB.
     - Press RETURN Soft Function Key F6.
     - Press S=On/Off Soft Function Key F6 until *S=* is displayed beside Output Level Field to activate SINAD Search Function.
     - Press S=On/Off Soft Function Key F6 until *S=* disappears to deactivate SINAD Search Function.

4. Select Output (6) as follows:

   - Press T/R Soft Function Key F1 to select T/R Connector as output connector.
   - Press AUX Soft Function Key F2 to select AUX RF Connector as output connector.
   - Press T/R Gate Soft Function Key F3 to select T/R Connector as output connector.
   - Press AUX Gate Soft Function Key F4 to select AUX RF Connector as gated output connector.



5. Modulation Source Window (7) displays all active Function Generators. To activate or deactivate Function Generators, each Function Generator must be edited separately. If two (or more) sections of the RF Modulator are set in conflict (e.g. GEN1 set for PM and GEN2 set for FM, or GEN1 set for 0.001 kHz deviation and GEN2 set for 2.60 kHz deviation) the screen displays the invalid source grayed

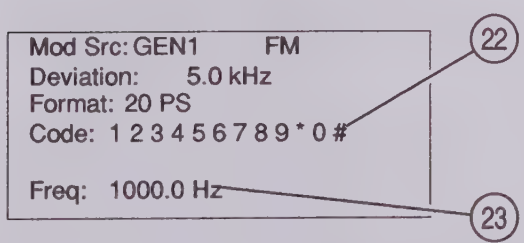
out. Set Modulation Source Block (8) as follows:

- If Audio Generator 1 (GEN1) Operation is desired, perform Step 6.
- If Audio Generator 2 (GEN2) Operation is desired, perform Step 7.
- If DATA Generator (DATA) Operation is desired, perform Step 8.
- If DTMF Generator (DTMF) Operation is desired, perform Step 9.
- If External Modulation (EXT) Operation is desired, perform Step 10.
- If Microphone Modulation (MIC) Operation is desired, perform Step 11.

6. If Audio Generator 1 (GEN1) Operation is desired, set Modulation Source Block (8) as follows:
   - Press GEN1 Soft Function Key F1 to select GEN1 for Modulation Source (16).
   - Select Modulation Type (17) as follows:
     - Press OFF Soft Function Key F1 to deactivate GEN1.
     - Press AM Soft Function Key F2 if AM Modulation is desired.
     - Press FM Soft Function Key F3 if FM Modulation is desired.
     - Press PM Soft Function Key F4 if PM Modulation is desired.
   - Enter Deviation/Modulation Level (18). Range is 0.00 to 100 kHz for FM Modulation, 0.0% to 100.0% for AM Modulation and 0.00 to 10 Radians for PM Modulation.
   - Select Format (19). Formats available include TONE and USER.
   - With cursor on Format (19), select transmission type:
     - Press CONT Soft Function Key F2 to select continuous transmission of signal.
     - Press BURST Soft Function Key F3 if single transmission of selected signal.
     - If TONE is selected as Format (19), press TIME Soft Function Key F4 to access Burst TIme WIndow. Enter Burst Time. Press RETURN Soft Function Key F6 to exit Window.
     - IF USER is selected as Format (19), press CONFIG Soft Function Key F4 to access Configuration Window for configuring User Selectable Frequency and Duration for codes 0 through 9 and A through T. Enter desired frequencies and durations for codes. Range of frequencies are 0 to 9999.9 Hz. Range of durations are 0 to 99.999 seconds. Use PG UP Soft Function Key F1 to scroll up through Configuration Window. Use PG DN to scroll down through Configuration Window. Use FILL Soft Function Key F3 to fill remainder of current column with value of current cursor position. Press RETURN Soft

Function Key F6 to exit Window.

- If TONE is selected as Format (19):
  - Enter Audio Tone Frequency (20). Range is 5 Hz to 20000 Hz with Shape (21) set to SINE. Range is 5 Hz to 10000 Hz otherwise.
  - Select Shape (21) of Wave as follows:
    - Press SINE Soft Function Key F1 to select SINE Wave Shape.
    - Press RAMP Soft Function Key F2 to select RAMP Wave Shape.
    - Press TRIANGLE Soft Function Key F3 to select TRIANGLE Wave Shape.
    - Press SQUARE Soft Function Key F4 to select SQUARE Wave Shape.



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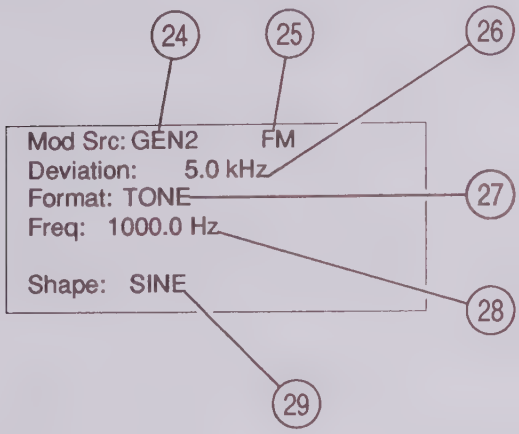
- If TONE is not selected Format (19):
  - Enter Code (22). Pressing CLEAR Soft Function Key F1 clears current code entry.



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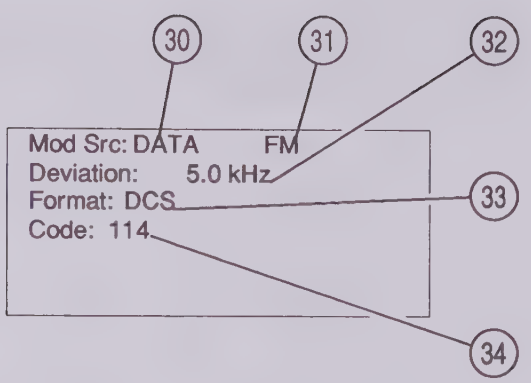
7. If Audio Generator 2 (GEN2) Operation is desired, set Modulation Source Block (8) as follows:
   - Press GEN2 Soft Function Key F2 to select GEN2 for Modulation Source (24).
   - Select Modulation Type (25) as follows:
     - Press OFF Soft Function Key F1 to deactivate GEN2.
     - Press AM Soft Function Key F2 if AM Modulation is desired.
     - Press FM Soft Function Key F3 if FM Modulation is desired.
     - Press PM Soft Function Key F4 if PM Modulation is desired.
   - Enter Deviation/Modulation Level (26). Range is 0.00 to 100 kHz for FM Modulation, 0.0% to 100.0% for AM Modulation and 0.00 to 10 Radians for PM Modulation.



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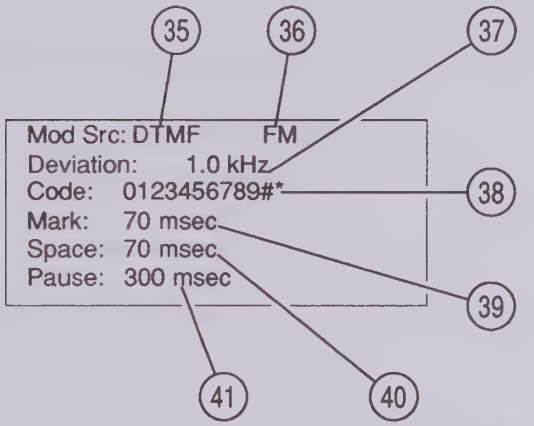
8. If DATA Generator (DATA) Operation is desired, set Modulation Source Block (8) as follows:

   - Press DATA Soft Function Key F3 to select DATA for Modulation Source (30).
   - Select Modulation Type (31) as follows:
     - Press OFF Soft Function Key F1 to deactivate DATA.
     - Press AM Soft Function Key F2 if AM Modulation is desired.
     - Press FM Soft Function Key F3 if FM Modulation is desired.
     - Press PM Soft Function Key F4 if PM Modulation is desired.
   - Enter Deviation/Modulation Level (32). Range is 0.00 to 100 kHz for FM Modulation, 0.0% to 100.0% for AM Modulation and 0.00 to 10 Radians for PM Modulation.
   - Select Format (33) as follows:
     - Press DCS Soft Function Key F1 to select DCS Format.
     - Press DCS/ Soft Function Key F2 to select DCS Inverted Format.
   - Enter desired Code (34). Range is 000 (Octal) to 777 (Octal).



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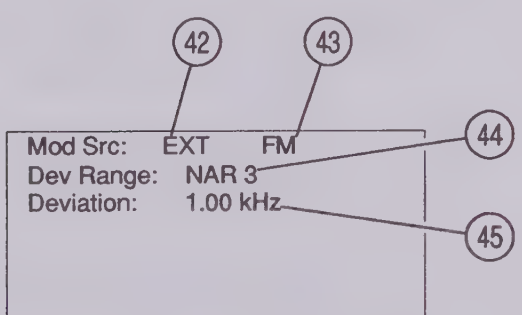
9. If DTMF Generator (DTMF) Operation is desired, set Modulation Source Block (8) as follows:

   - Press DTMF Soft Function Key F4 to select DTMF for Modulation Source (35).
   - Select Modulation Type (36) as follows:
     - Press OFF Soft Function Key F1 to deactivate DTMF.
     - Press AM Soft Function Key F2 if AM Modulation is desired.
     - Press FM Soft Function Key F3 if FM Modulation is desired.
     - Press PM Soft Function Key F4 if PM Modulation is desired.
   - Enter Deviation/Modulation Level (37). Range is 0.00 to 100 kHz for FM Modulation, 0.0% to 100.0%

for AM Modulation and 0.00 to 10 Radians for PM Modulation.

- Enter DTMF Code (38).
- Select desired Operation as follows:
  - Press CLEAR Soft Function Key F1 to clear code field of current data.
  - Press CONT Soft Function Key F2 to activate DTMF Code (38) in repeating loop.
  - Press BURST Soft Function Key F3 to activate DTMF Code (38) for one tone sequence.
  - Press KEY Soft Function Key F4 to set DATA ENTRY Keys as DTMF keypad.
- Enter selected Mark Time (39) for DTMF tones. Range is 10 to 999 ms.
- Enter selected Space Time (41) for DTMF tones. Range is 1 to 999 ms.
- Enter selected Pause Time (40) for DTMF tones. Range is 1 to 999 ms.



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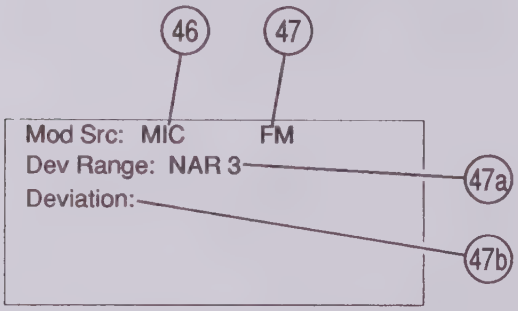
10. If External Modulation (EXT) Operation is desired, set Modulation Source Block (8) as follows:
    - Press EXT Soft Function Key F5 to select EXT for Modulation Source (42).
    - Select Modulation Type (43) as follows:
      - Press OFF Soft Function Key F1 to deactivate EXT.
      - Press AM Soft Function Key F2 if AM Modulation is desired.
      - Press FM Soft Function Key F3 if FM Modulation is desired.
      - Press PM Soft Function Key F4 if PM Modulation is desired.
      - Press SET Soft Function Key F6 to preserve settings.
    - If FM Modulation is selected, select Dev (Deviation) Range (44) as follows:
      - Press NAR 3 Soft Function Key F1 for Deviation Range (44) setting for deviation <2 kHz.
      - Press NAR 2 Soft Function Key F2 for Deviation Range (44) setting for deviation 2 kHz to 12.75 kHz.
      - Press NAR 1 Soft Function Key F3 for Deviation Range (44) setting for deviation 12.75 kHz to 25 kHz.
      - Press WIDE Soft Function Key F4 for Deviation Range (44) setting for deviation >25 kHz.

If other sources are Frequency Modulated and total deviation exceeds 20 kHz, Deviation Range (44) is automatically set to ***WIDE***.



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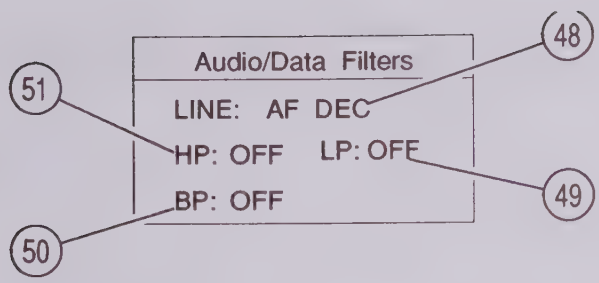
11. If Microphone Modulation (MIC) Operation is desired, set Modulation Source Block (8) as follows:

    - Press MIC Soft Function Key F6 to select MIC for Modulation Source (46).
    - Select Modulation Type (47) as follows:
        - Press OFF Soft Function Key F1 to deactivate MIC.
        - Press AM Soft Function Key F2 if AM Modulation is desired.
        - Press FM Soft Function Key F3 if FM Modulation is desired.
        - Press PM Soft Function Key F4 if PM Modulation is desired.
    - If FM Modulation is selected, select Dev (Deviation) Range (47a) as follows:
        - Press NAR 3 Soft Function Key F1 for Deviation Range (47a) setting for deviation <2 kHz.
        - Press NAR 2 Soft Function Key F2 for Deviation Range (47a) setting for deviation 2 kHz to 12.75 kHz.
        - Press NAR 1 Soft Function Key F3 for Deviation Range (47a) setting for deviation 12.75 kHz to 25 kHz.
        - Press WIDE Soft Function Key F4 for Deviation Range (47a) setting for deviation >25 kHz.



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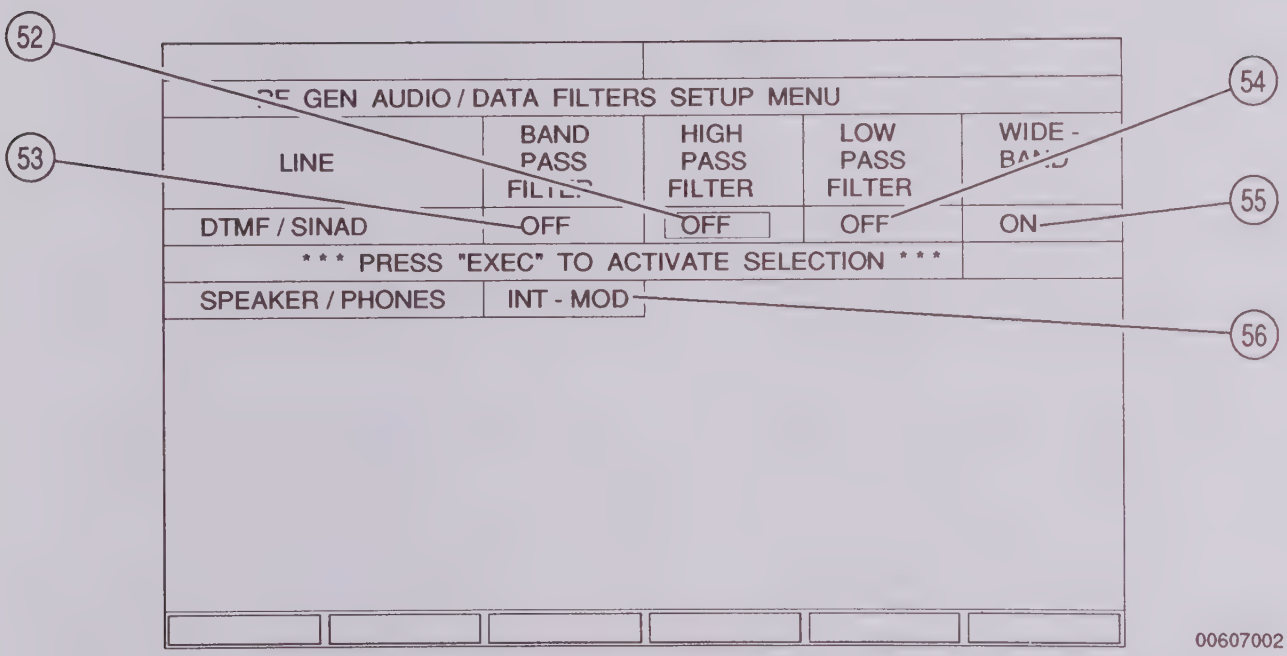

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12. If Audio/Data Filters are required for operation of Meters or Speaker, configure and activate required filters as follows:

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter do not operate simultaneously on same Filter Line.

- With cursor on Filter Line (48), press CONFIG Soft Function Key F6 to access RF Generator Filters Menu.
- Select DTMF/SINAD Bandpass Filter Field (53) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press C-MSG Soft Function Key F2 to select C-Message Weighted Filter.
- Select DTMF/SINAD High-Pass Filter Field (52) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press 300 Hz Soft Function Key F2 to activate 300 Hz High-Pass Filter.

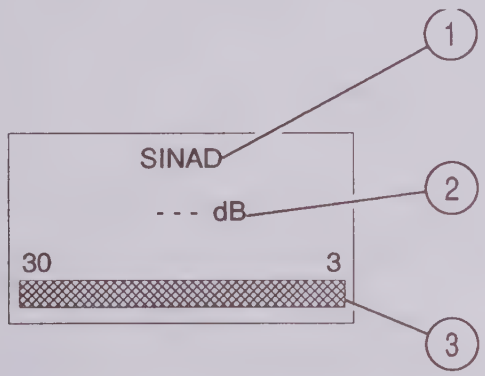
- Select DTMF/SINAD Low-Pass Filter Field (54) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press 4 kHz Soft Function Key F3 to activate 4 kHz Low-Pass Filter.
  - Press 20 kHz Soft Function Key F4 to activate 20 kHz Low-Pass Filter.
- Press EXEC Soft Function Key F5 to Execute all edits made to the screen.
- Select Speaker/Headphones Filter Field (56) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press C-MSG Soft Function Key F2 to select C-Message Weighted Filter.
  - Press W.B. Soft Function Key F3 to select no filtering.
  - Press INT-MOD Soft Function Key F4 to route from Internal Modulation Sources to Speaker.
- Move Cursor off Speaker/Headphones Filter Field (56) and press RETURN Soft Function Key F6 to return to RF Generate Operation Screen.
- To display different Filter Line (48) settings:
  - Press AF DEC Soft Function Key F1 to display DTMF/SINAD Filter Settings.
  - Press SPKR Soft Function Key F2 to display Speaker/ Headphones Filter Settings.

13. Select desired Meter Operation as follows:
    - Press SINAD Soft Function Key F2 to select SINAD Meter as active meter. Not displayed if meter is currently active.
    - Press DIST Soft Function Key F3 to select Distortion Meter as active meter. Not displayed if meter is currently active.
14. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

B. SINAD METER

The SINAD Meter for the RF Generate Operation Screen measures SINAD for an audio signal passed through the AUDIO/DATA IN Connector. Filtering for the signal passed to the SINAD Meter is provided by the Audio/Data Filters.

Configure and operate the SINAD Meter as follows:



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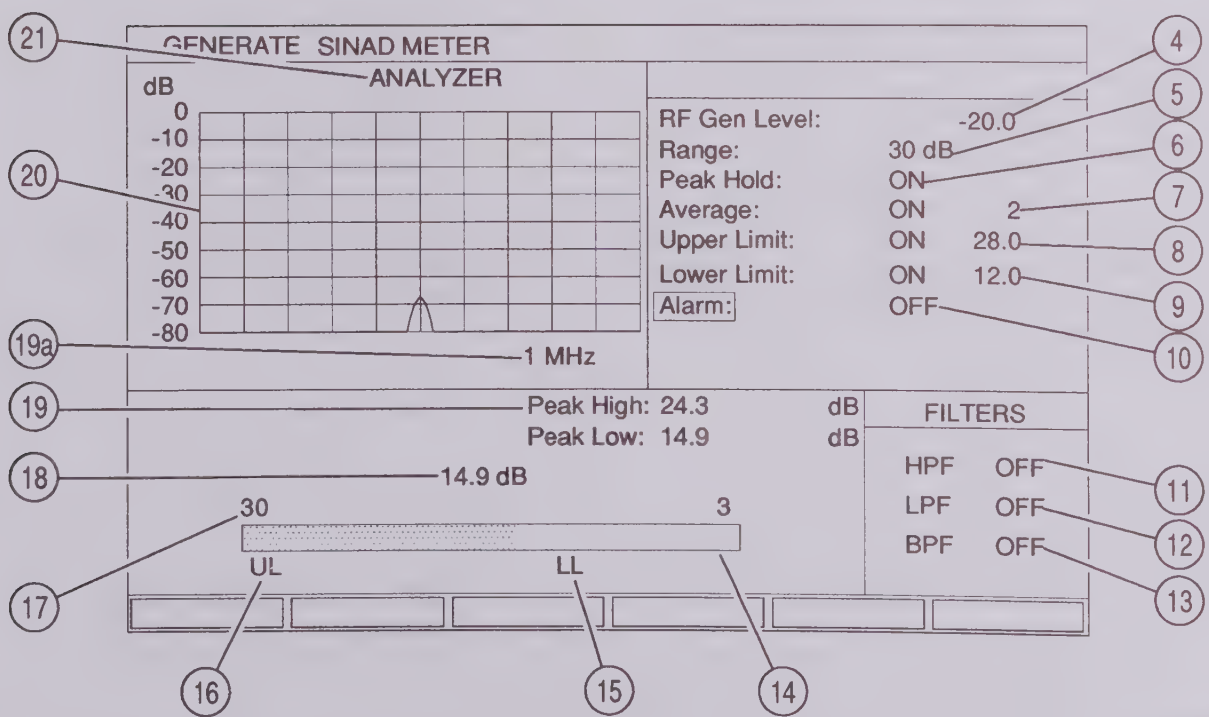

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1. With cursor on SINAD/Distortion Meter Label (1), press ZOOM Soft Key F1. Full Screen SINAD Meter is displayed.

2. Enter RF Gen Level as required. Editing field affects Level on RF Generate Operation Screen. To operate with SINAD Search Function:

   - Press SINAD= Soft Function Key F5 to access field to set SINAD Search Function value. Range of SINAD= is 6.0 to 30.00 dB.

   - Press S=On/Off Soft Function Key F6 until *S=* is displayed beside RF Gen Level Field to activate SINAD Search Function.

   - Press S=On/Off Soft Function Key F6 until *S=* disappears to deactivate SINAD Search Function.

3. Select Range (5) as follows:

   - Press 15 dB Soft Function Key F1 to select 15 dB Range (5).

   - Press 30 dB Soft Function Key F2 to select 30 dB Range (5).

   - Press AUTO Soft Function Key F3 to select Autorange for Range (5).

4. If Peak Hold Function is desired, take the meter out of Autorange and configure as follows:

   - With cursor on Peak Hold (6), press OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***ON***.

   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.

   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***OFF***.

5. If Average Function is desired, configure as follows:

   - With cursor on Average (7), press OFF/ON Soft Function Key F1 until Average (7) displays ***ON*** and Sample Number appears.

   - With cursor on Sample Number, enter Sample Number. Range is 2 to 10.

   - With cursor on Average (7), press OFF/ON Soft Function Key F1 until Average (7) displays ***OFF***.

6. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (8), press OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***ON*** and Limit Value appears.

   - Enter Limit Value. Range is 0 to 30.

   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***OFF***.

7. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (9), press OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***ON*** and Limit Value appears.

   - Enter Limit Value. Range is 0 to 30.

   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***OFF***.

8. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (10), press OFF/ON Soft Function Key F1 until Alarm (10) displays ***ON***.

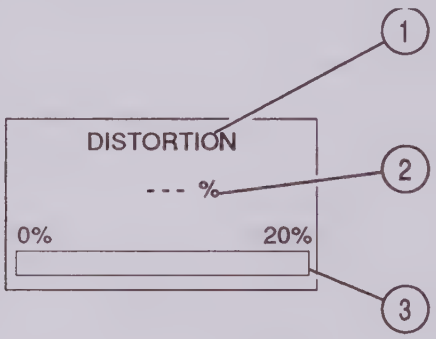
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (10) displays ***OFF***.

9. If displayed, press RETURN Soft Function Key F6 to return to RF Generate Operation Screen. Alternately, press GEN MODE Key to return to RF Generate Operation Screen.

C. DISTORTION METER

The Distortion Meter for the RF Generate Operation Screen measures Distortion for an audio signal passed through the AUDIO/DATA IN Connector. Filtering for the signal passed to the Distortion Meter is provided by the Audio/Data Filters.

Configure and operate the Distortion Meter as follows:



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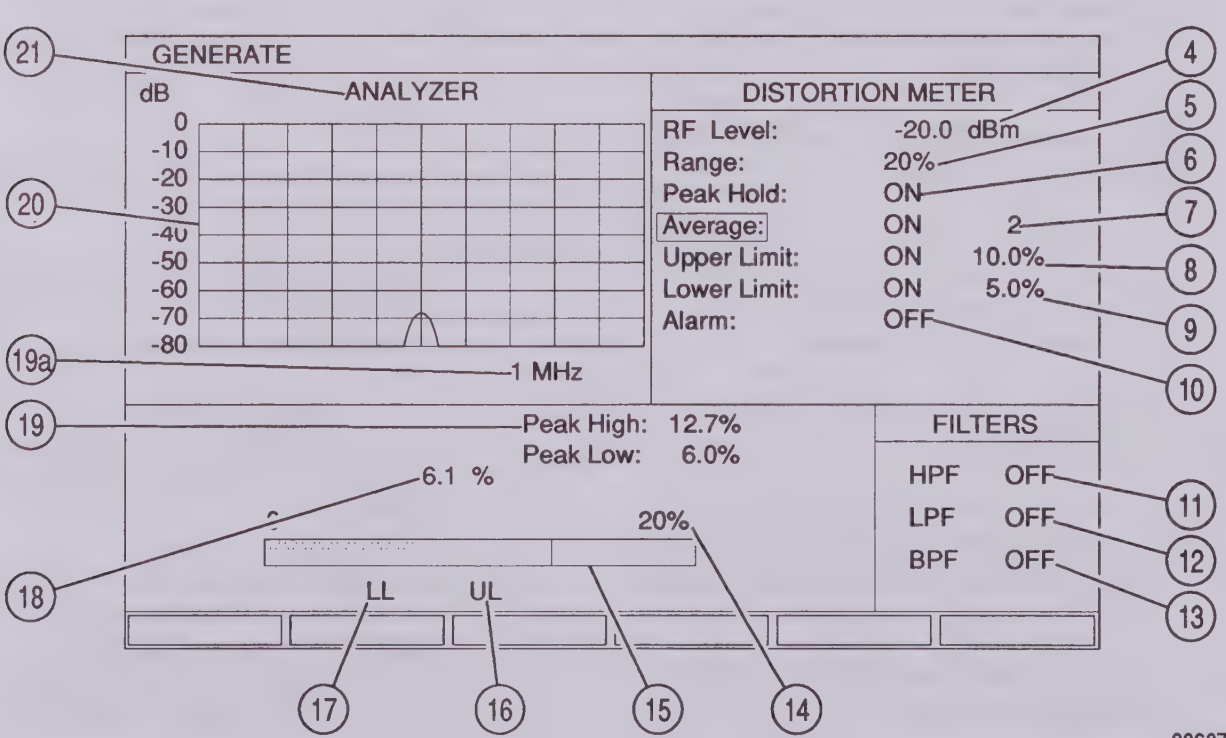

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1. With cursor on SINAD/Distortion Meter Label (1), press ZOOM Soft Key F1. Full Screen Distortion Meter is displayed.

2. Enter RF Gen Level as required. Editing field affects Level on RF Generate Operation Screen.

3. If Peak Hold Function is desired, configure as follows:

   - With cursor on Peak Hold (6), press OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***ON***.

   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.

   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***OFF***.

4. If Average Function is desired, configure as follows:

   - With cursor on Average (7), press OFF/ON Soft Function Key F1 until Average (7) displays ***ON*** and Sample Number appears.

   - Enter Sample Number. Range is 2 to 10.

   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (7) displays ***OFF***.

5. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (8), press OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***ON*** and Limit Value appears.

   - Enter Limit Value. Range is 0.0% to 20.0%.

   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***OFF***.

6. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (9), press OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***ON*** and Limit Value appears.

   - Enter Limit Value. Range is 0.0% to 20.0%.

   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***OFF***.

7. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (10), press OFF/ON Soft Function Key F1 until Alarm (10) displays ***ON***.

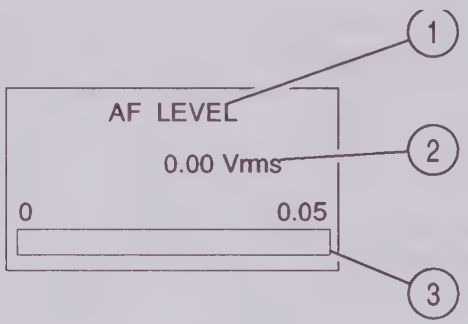
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (10) displays ***OFF***.

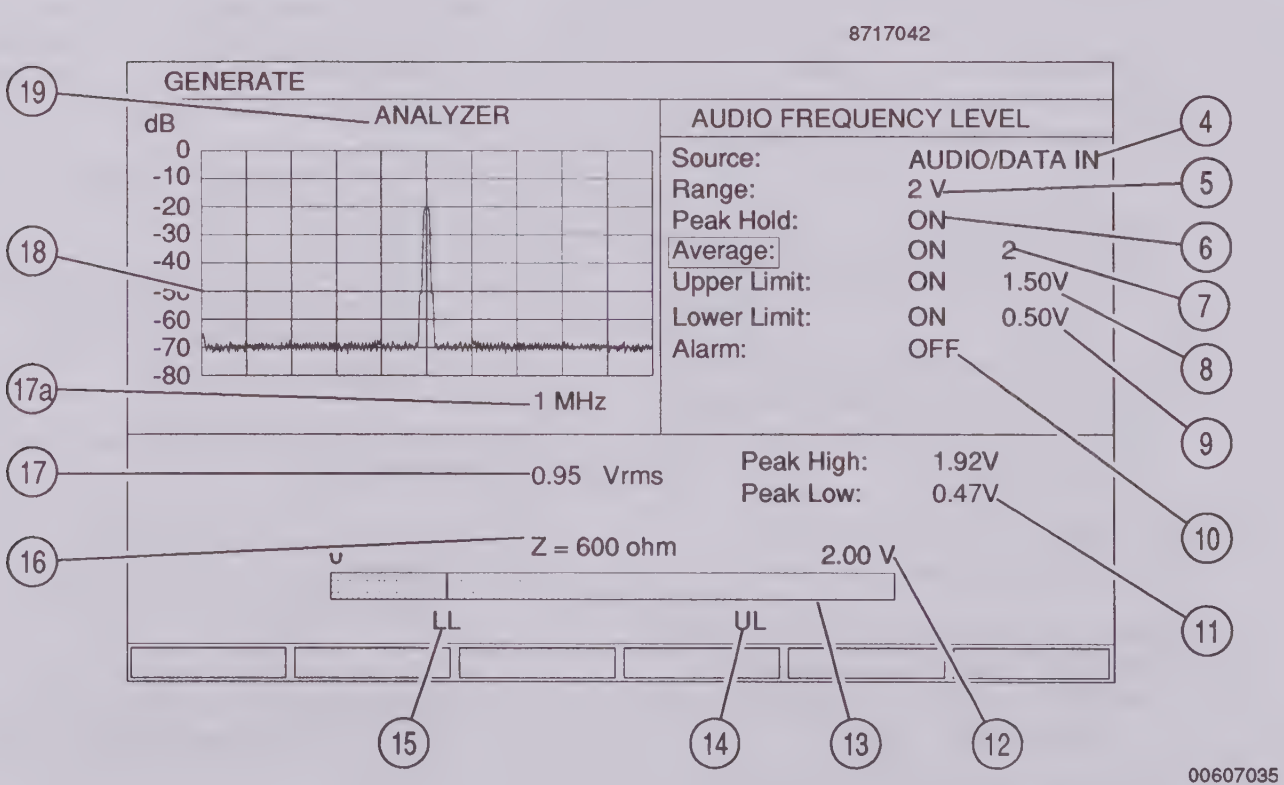
8. If displayed, press RETURN Soft Function Key F6 to return to RF Generate Operation Screen. Alternately, press GEN MODE Key to return to RF Generate Operation Screen.

D. AUDIO FREQUENCY LEVEL (AF LVL) METER

The Audio Frequency Level Meter for the RF Generate measures the level of an audio signal passed through the AUDIO/DATA IN Connector. Measurements made are in Vrms, dBm (referenced to Impedance [16]) or dB as selected.

Configure and operate the AF Level Meter as follows:





1. With cursor on AF LVL Meter Label (1), press ZOOM Soft Key F1. Full Screen Audio Frequency Level Meter is displayed.

2. Select desired Range (5). Selections include AUTO (Autorange) and the following:

50 mV	100 mV	200 mV
500 mV	1 V	2 V
5 V	10 V	20 V
50 V		

   Selecting Digital Readout (17) units of dBm or dB sets Range (5) to AUTO (Autorange).

3. If Peak Hold Function is desired, configure as follows:

   - With cursor on Peak Hold (6), press OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***OFF***.

4. If Average Function is desired, configure as follows:

   - With cursor on Average (7), press OFF/ON Soft Function Key F1 until Average (7) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (7) displays ***OFF***.

5. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (8), press OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 50 Vrms.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***OFF***.

6. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (9), press OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 50 Vrms.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***OFF***.

7. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (10), press OFF/ON Soft Function Key F1 until Alarm (10) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (10) displays ***OFF***.

8. Select desired Units for Digital Readout (17) as follows:

   - Press Vrms Soft Function Key F1 to select units of Vrms.

- Press dBm Soft Function Key F2 to select units of dBm.
- Press dB Soft Function Key F3 to select units of dB. Press dB Soft Function Key F3 as needed to set current reading as Reference.

9. If Digital Readout (17) Units are dBm, select Impedance (16). Range is 0 to 1000 Ω.

10. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

11. If displayed, press RETURN Soft Function Key F6 to return to RF Generate Operation Screen. Alternately, press GEN MODE Key to return to RF Generate Operation Screen.

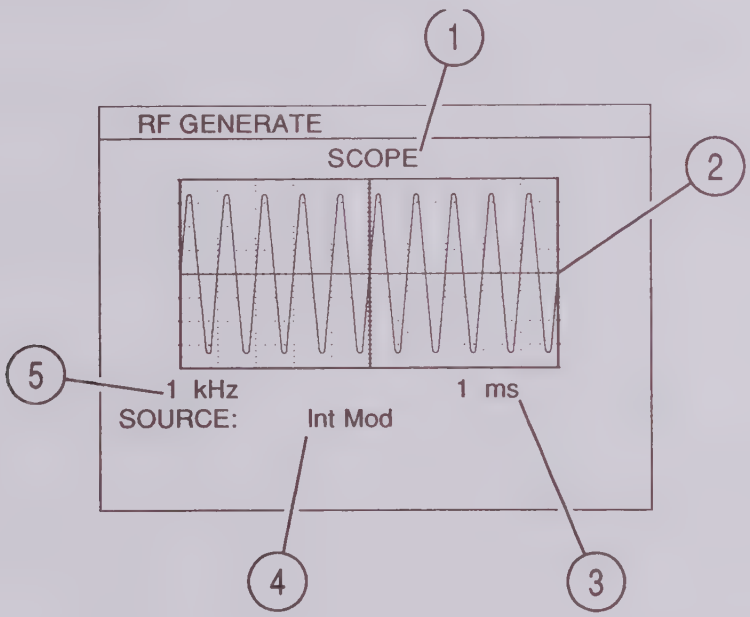
E. OSCILLOSCOPE OPERATION SCREEN

The RF Generator Oscilloscope is usable as an abbreviated Oscilloscope and as a Full Screen Oscilloscope. Configuring one is reflected in the other.

The abbreviated Oscilloscope, as shown below, is visible from the RF Generate Operation Screen and the following meters:

SINAD Meter Operation Screen
Distortion Meter Operation Screen
Audio Frequency Level Meter Operation Screen

Parameters set on any of the Operation Screens are reflected in all. Configuring the abbreviated Oscilloscope is as follows:



1. Select Sweep (3). Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

   - Press ROLL Soft Function Key F2 to view the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.
   - Press SLOW Soft Function Key F2 to return to the normal mode of operation.

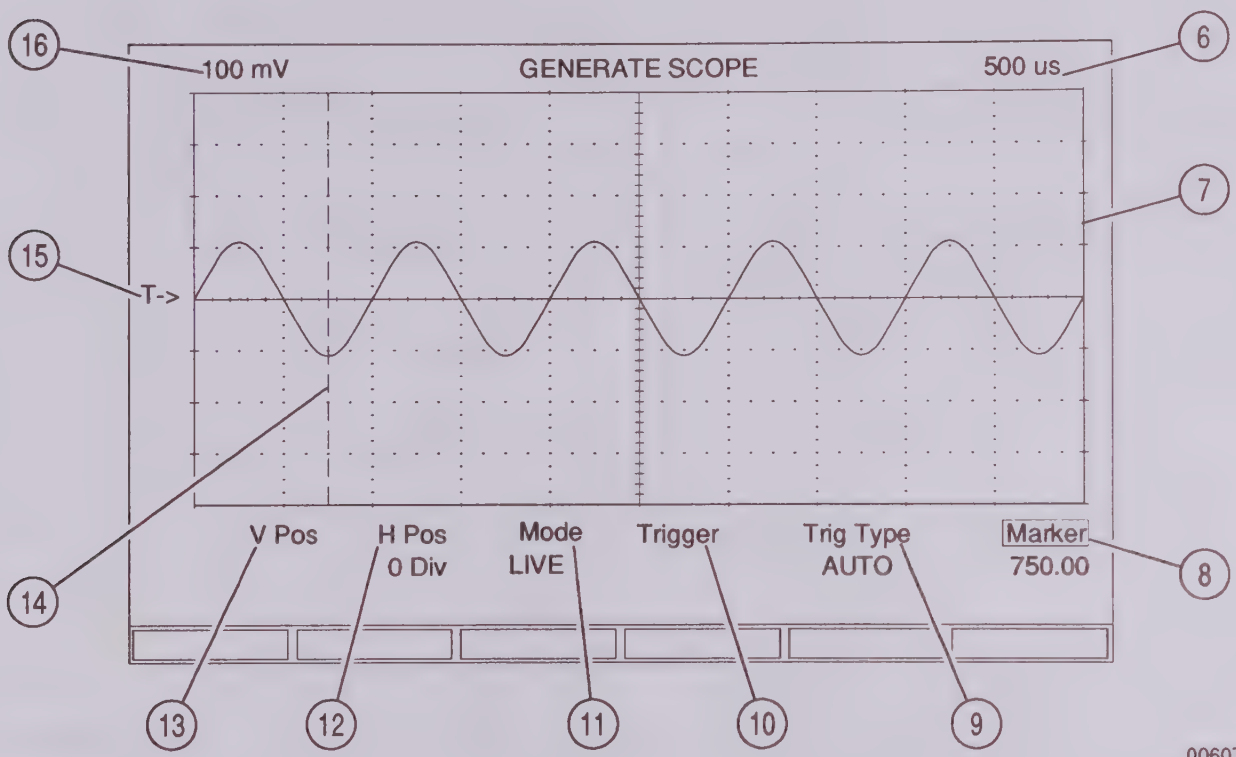
2. Select SCOPE SOURCE (4). Selections include:

Source	Signal Input	Signal Type
Scope/DVM-GND	SCOPE/DVM Connector	External Ground-Coupled Signal
Scope/DVM-AC	SCOPE/DVM Connector	External AC-Coupled Signal
Scope/DVM-DC	SCOPE/DVM Connector	External DC-Coupled Signal
Ext Mod	EXT MOD IN Connector	External Modulation
Notch Residual	Internal Filtered Signal	Notch Filtered Signal passed to SINAD and Distortion Meters. Reading is relative with no units applied.
Audio/Data In	AUDIO/DATA IN Connector	External Audio or Data Signal
Int Mod	Internal Modulation	Composite Modulation Signal generated by Internal Audio/Data Generators

3. Select Oscilloscope Scale (5). Selections include:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
Ext Mod	100, 200, 500 mV/Div 1, 2, 5 V/Div
Notch Residual	0.002, 0.004, 0.10, 0.20, 0.40, 1.00
Audio/Data In	100, 200, 500 mV/Div 1, 2, 5 V/Div
Int Mod	
GEN1 FM >25 kHz:	1, 2, 5, 10, 20, 50 kHz/Div
GEN1 FM 2.5 to 12.75 kHz:	1, 2, 5, 10, 20, 50 kHz/Div
GEN1 FM 12.75 to 25 kHz:	.2, .4, 1, 2, 4, 10 kHz/Div
GEN1 FM <2.5 kHz:	.2, .4, 1, 2, 4, 10 kHz/Div
GEN1 PM <2.55 RAD:	.2, .4, 1, 4, 10 RAD/Div
GEN1 PM >2.55 RAD:	1, 2, 5, 10, 20,50 RAD/Div
GEN1 AM:	all settings 20%

Pressing ZOOM Soft Function Key F1 accesses full screen Oscilloscope, when cursor is on SCOPE/ANALYZER Prompt (1) of RF Generate Operation Screen and abbreviated Oscilloscope is displayed. SCOPE SOURCE (4) must be selected before Full Screen Oscilloscope is accessed. Configure the full screen Oscilloscope as follows:



1. Select Sweep (6). Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

Press ROLL Soft Function Key F2 to view the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher. Press SLOW Soft Function Key F2 to return to the normal mode of operation.

2. Select Trigger Type (9) as follows:

- Press NORM Soft Function Key F1 to select Normalized Trigger.
- Press AUTO Soft Function Key F2 to select Auto Trigger.
- Press 1 SHOT Soft Function Key F3 to select One Shot Trigger. Press 1 SHOT Soft Function Key F3 as needed to reset Trigger.

3. Set Trigger Level (15) as follows:

- Move cursor to Trigger (10).
- Use DATA SCROLL Spinner or DATA SCROLL Keys to set Trigger.

4. Select Operation Mode (11) as follows:

- Press LIVE Soft Function Key F2 to select Live Operation Mode.

- Press AVG Soft Function Key F3 to select Average Operation Mode.
- Press COMPARE Soft Function Key F4 to select Compare Operation Mode.
- Press RECALL Soft Function Key F5 to select Recall Operation Mode.
- Press STORE Soft Function Key F6 to select Store Operation Mode.

5. Select H Pos (12) Offset as needed. Range is -10 to 10 Divisions.

6. Set Vertical Position of trace as needed by accessing V Pos (13) and editing with DATA SCROLL Keys or DATA SCROLL Spinner.

7. Select Oscilloscope Scale (16). Selections available are dependent on Scope Source (4). Selections include:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
Ext Mod	100, 200, 500 mV/Div 1, 2, 5 V/Div
Notch Residual	0.002, 0.004, 0.10, 0.20, 0.40, 1
Audio/Data In	100, 200, 500 mV/Div 1, 2, 5 V/Div
Int Mod GEN1 FM >25 kHz: GEN1 FM 2.5 to 12.75 kHz: GEN1 FM 12.75 to 25 kHz: GEN1 FM <2.5 kHz: GEN1 PM <2.55 RAD: GEN1 PM >2.55 RAD: GEN1 AM:	

8. Activate Marker (14), as required, as follows:
   - With Cursor on Marker Position (8), press On/Off Soft Function Key F1.
   - Enter Desired Marker Position using DATA ENTRY Keys or DATA SCROLL Keys and/or DATA SCROLL Spinner.

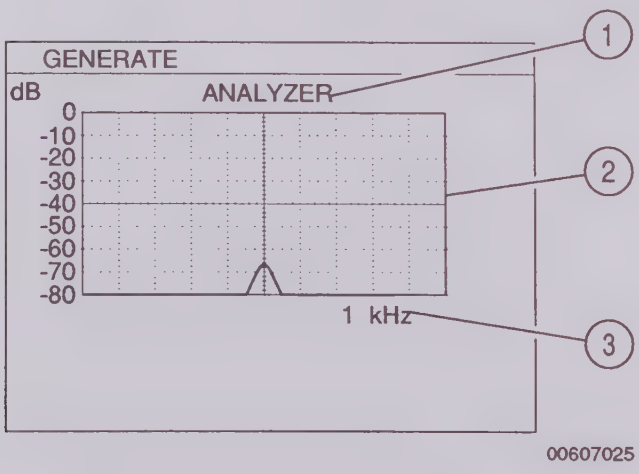
F. SPECTRUM ANALYZER OPERATION SCREEN

The RF Generator Spectrum Analyzer is usable as an abbreviated Spectrum Analyzer or as a Full Screen Spectrum Analyzer. Configuring one is reflected in the other.

The abbreviated Spectrum Analyzer, as shown below, is visible from the RF Generate Operation Screen and the following Meters:

SINAD Meter Operation Screen
Distortion Meter Operation Screen
Audio Frequency Level Meter Operation Screen

Parameters set on any of the above Operation Screens are reflected in all. Configuring the abbreviated Spectrum Analyzer is as follows:



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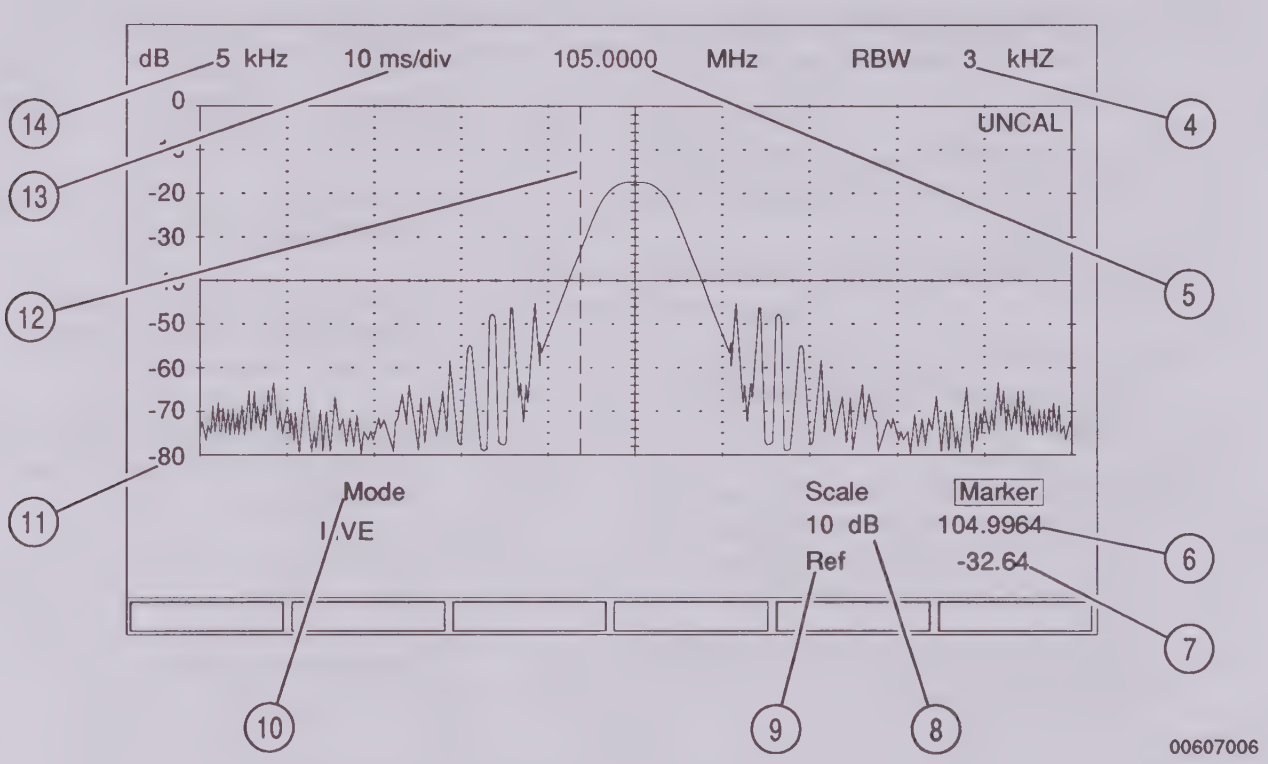
1. Select Scan Width (3). Selections include zero scan and:

1 kHz	2 kHz	5 kHz
10 kHz	20 kHz	50 kHz
100 kHz	200 kHz	500 kHz
1 MHz		

- Press MENU Soft Function Key F1 for menu selections.
- Press CONFIG Soft Function Key F2 to access a pop up screen to configure Scan Width, Resolution Bandwidth (RBW) and Sweep rate.

Pressing ZOOM Soft Function Key F1 accesses full screen Spectrum Analyzer, when cursor is on SCOPE/ANALYZER Prompt (1) of RF Generate Operation Screen and abbreviated Spectrum Analyzer is displayed. Available features and parameters are described below:



1. Set Center Frequency (5). Press Set Ref Soft Function Key F1 to set current Center Frequency as Reference Frequency.

2. Select Scan Width (14). Selections include zero scan and:

1 kHz	2 kHz	5 kHz
10 kHz	20 kHz	50 kHz
100 kHz	200 kHz	500 kHz
1 MHz	2 MHz	5 MHz
10 MHz	20 MHz	50 MHz
100 MHz		

   The word "UNCAL" appears in the display when combinations of RBW, frequency span and sweep rate for which the analyzer is not calibrated are used.

3. Set Scale (8) as follows:

   - Press 10 dB Soft Function Key F1 to select 10 dB for Vertical Scale (11).
   - Press 2 dB Soft Function Key F2 to select 2 dB for Vertical Scale (11).

4. Select Mode (10) as follows:

   - Press PKHOLD Soft Function Key F1 to select Peak Hold Operation Mode.
   - Press LIVE Soft Function Key F2 to select Live Operation Mode.
   - Press AVG Soft Function Key F3 to select Average Operation Mode.

- Press COMPARE Soft Function Key F4 to select Compare Operation Mode.

- Press RECALL Soft Function Key F5 to select Recall Operation Mode.

- Press STORE Soft Function Key F6 to select Store Operation Mode.

5. Activate Marker (12), as required, as follows:

   - With Cursor on Marker Position (6), press On/Off Soft Function Key F1.

   - Enter Desired Marker Position using DATA ENTRY Keys or DATA SCROLL Keys and/or DATA SCROLL Spinner.

6. Access Ref (9) Field to adjust Vertical Scale (11), as needed.

7. If Scan Width (14) is set to zero scan, enter Zero Scan Sweep (13). Selections Include:

200 µs/div	500 µs/div	1 ms/div
2 ms/div	5 ms/div	10 ms/div
20 ms/div	50 ms/div	100 ms/div
200 ms/div	500 ms/div	

   - Press MENU Soft Function Key F1 to set Zero Scan Sweep.

   - Press Press RETURN Soft Function Key F6 to exit into normal operation.

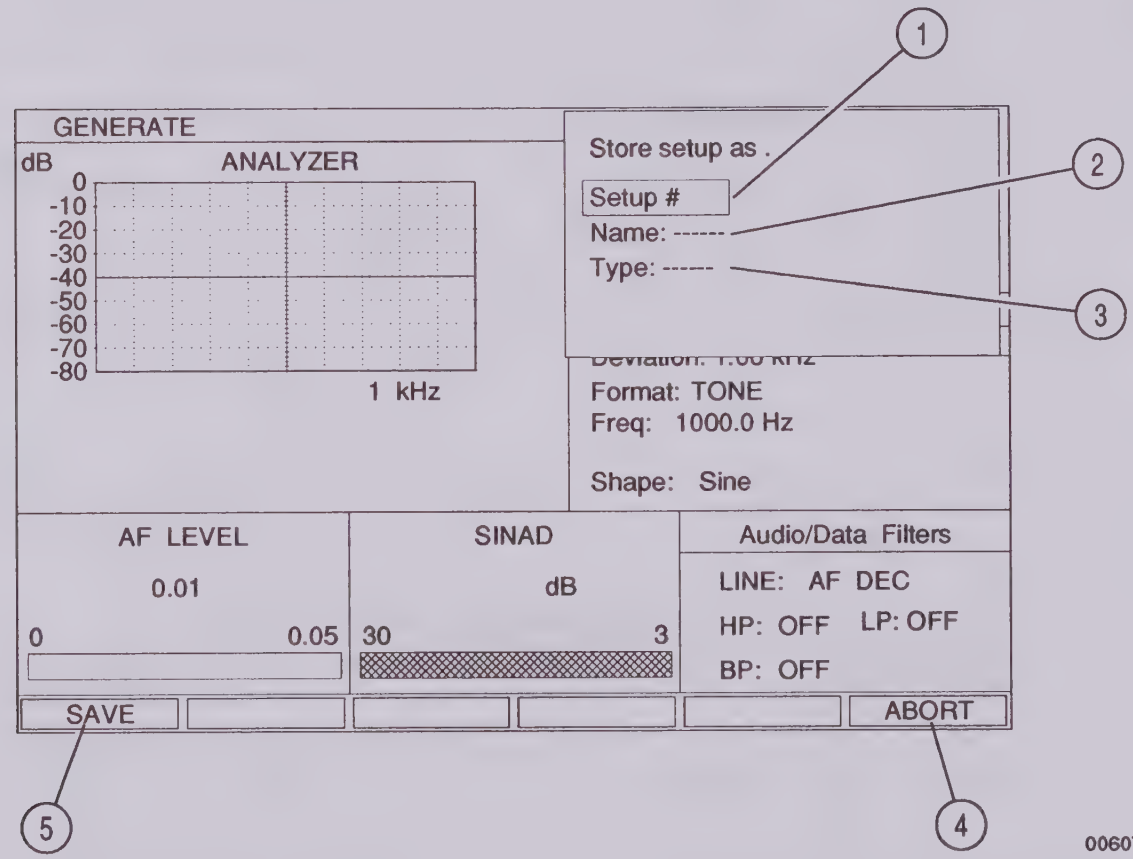
   - Press DEFLT Soft Function Key F5 to set the current field to factory default.

   - Press COUPLE Soft Function Key F6 to set the sweep and RBW to factory default state for the current scan width.

G. STORE AND RECALL OPERATION

Pressing STORE Memory Key allows the operator to store up to 50 RF Generate Operation Screen configurations. Storage Locations 0 through 49 can be used to store a RF Generate Operation configuration, a RF Receive Operation configuration or a Duplex Operation configuration (Receive and Generate pair).

STORE Operation for RF Generate Operation is as follows:



1. Press STORE MEMORY Key.

2. Enter or scroll through Setup # (1) value. Range is 0 to 49. Press ENTER Key.

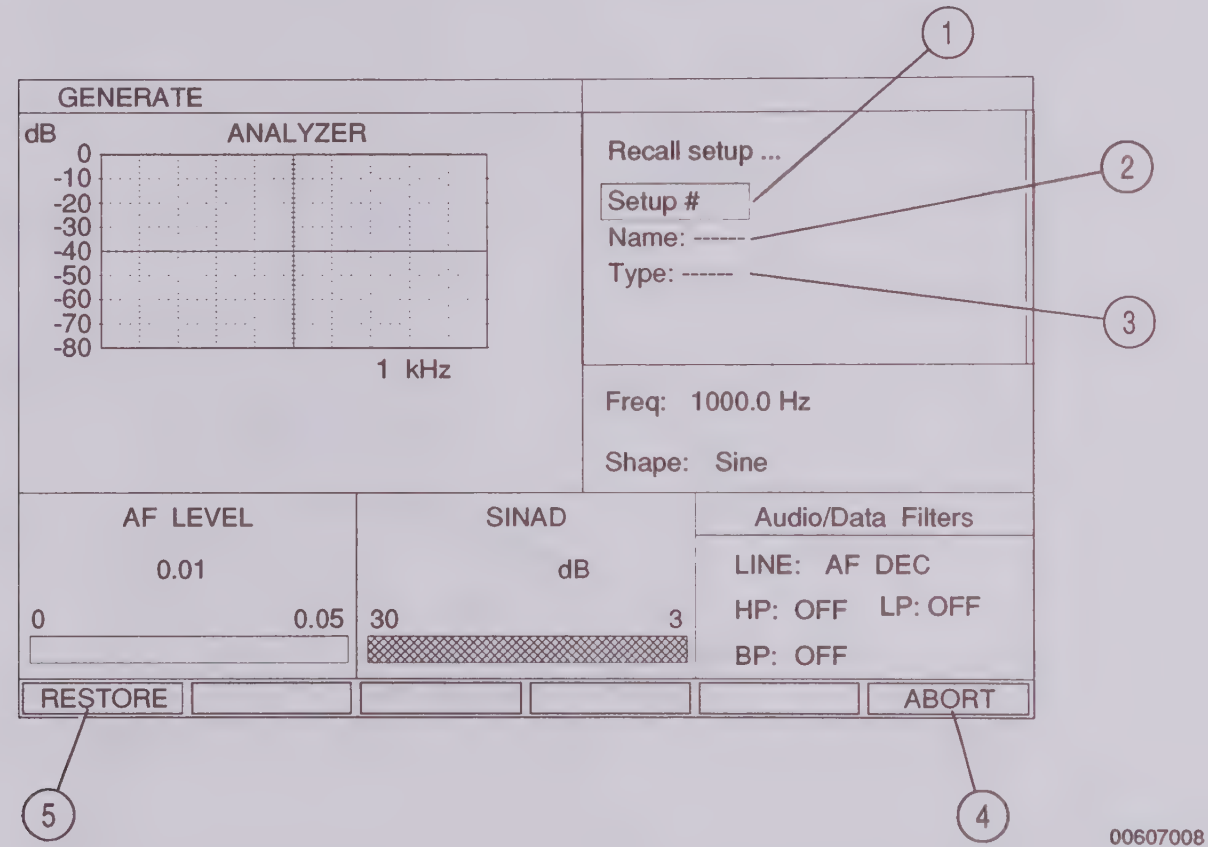
3. If Name (2) is desired, press ENTER Key, with Cursor on Name (2). Enter Name using DATA ENTRY Keys. Name can be alphabetic and/or numeric characters. Press ENTER Key.

4. Type (3) displays the type of data currently saved in the specified setup number. Types saved are: DUPLEX, GENERATOR, RECEIVER and EMPTY.

5. Press SAVE Soft Function Key F1 (5) to accept selections and save Setup. Press ABORT Soft Function Key F6 (4) to escape without saving Setup.

Pressing RCL Memory Key allows the operator to recall up to 100 previously stored operation screens. RF Receive, RF Generate or Duplex Operation Screen configurations and all be accessed from the RF Generate Operation Screen. Accessing anything other than an RF Generate Operation Screen configuration, automatically switches the COM-120B to the selected mode of operation.

RECALL Operation for RF Generate Operation is as follows:



1. Press RECALL MEMORY Key.

2. Enter Setup # (1) value. Range is 0 to 49. Press ENTER Key.

3. Type (3) displays the type of data currently saved in the specified setup number. Types recalled are:

   DUPLEX, GENERATOR, RECEIVER and EMPTY.

4. Press RESTORE Soft Function Key F1 (5) to accept selections and recall Setup. Press ABORT Soft Function Key F6 (4) to escape without recalling Setup.

4-2-2 GENERATING FM MODULATED RF SIGNAL

This procedure configures the RF Generate Operation Screen to transmit a 100 MHz FM Modulated RF Signal at the T/R Connector. The audio portion of the signal is a 1 kHz sine wave from Audio Generator 1. The deviation is set for 5 kHz. The Output Level is set to -50 dBm. The speaker is configured to play the internal modulated signal.

1. Set RF Field to ***100 MHz***.
2. Set Output Level to ***-50 dBm***.
3. Set Output to ***T/R***.
4. Select Audio Generator 1 (***GEN1***) for Modulation Source.
5. Set Modulation Type to ***FM***.
6. Set Deviation Level to ***5.00 kHz***.
7. Set Format to ***TONE***.
8. Set Tone Freq to ***1000.0 Hz***.
9. Set Shape to ***SINE***.
10. Access Filters Setup Menu. Set Speaker/Headphones Field to ***INT-MOD***. Return to RF Generate Operation Screen.
11. Set VOLUME Control for desired audio level.

4-2-3 GENERATING AM MODULATED RF SIGNAL

This procedure configures the RF Generate Operation Screen to transmit a 100 MHz AM Modulated RF Signal at the T/R Connector. The audio portion of the signal is a 1 kHz sine wave from Audio Generator 1. The Modulation is set for 50%. The Output Level is set to -50 dBm. The speaker is configured to play the internal modulated signal.

1. Set RF Field to ***100 MHz***.
2. Set Output Level to ***-50 dBm***.
3. Set Output to ***T/R***.
4. Select Audio Generator 1 (***GEN1***) for Modulation Source.
5. Set Modulation Type to ***AM***.
6. Set Modulation Level to ***50.0%***.
7. Set Format to ***TONE***.
8. Set Tone Freq to ***1000.0 Hz***.
9. Set Shape to ***SINE***.
10. Access Filters Setup Menu. Set Speaker/Headphones Field to ***INT-MOD***. Return to RF Generate Operation Screen.
11. Set VOLUME Control for desired audio level.

4-2-4 GENERATING PM MODULATED RF SIGNAL

This procedure configures the RF Generate Operation Screen to transmit a 100 MHz PM Modulated RF Signal at the T/R Connector. The audio portion of the signal is a 1 kHz sine wave from Audio Generator 1. The deviation is set for 5 Radians. The Output Level is set to -50 dBm.

1. Set RF Field to ***100 MHz***.
2. Set Output Level to ***-50 dBm***.
3. Set Output to ***T/R***.
4. Select Audio Generator 1 (***GEN1***) for Modulation Source.
5. Set Modulation Type to ***PM***.
6. Set Deviation Level to ***5.00 Rad***.
7. Set Format to ***TONE***.
8. Set Tone Freq to ***1000.0 Hz***.
9. Set Shape to ***SINE***.
10. Access Filters Setup Menu. Set Speaker/Headphones Field to ***INT-MOD***. Return to RF Generate Operation Screen.
11. Set VOLUME Control for desired audio level.

4-2-5 GENERATING DCS CODED RF SIGNAL

This procedure configures the RF Generate Operation Screen to transmit a 100 MHz RF Signal FM Modulated with a DCS Code at the T/R Connector. The deviation is set for .50 kHz. The Output Level is set to -50 dBm.

1. Set RF Field to ***100 MHz***.
2. Set Output Level to ***-50 dBm***.
3. Set Output to ***T/R***.
4. Select DATA Generator (***DATA***) for Modulation Source.
5. Set Modulation Type to ***FM***.
6. Set Deviation Level to ***.50 kHz***.
7. Set Format to ***DCS***.
8. Set Code to ***114***.

4-2-6 GENERATING DTMF CODED RF SIGNAL

This procedure configures the RF Generate Operation Screen to transmit a 100 MHz RF Signal FM Modulated with DTMF Code at the T/R Connector. The deviation is set for 5 kHz. The Output Level is set to -50 dBm. The signal is set to run in a continuous loop.

1. Set RF Field to ***100 MHz***.
2. Set Output Level to ***-50 dBm***.
3. Set Output to ***T/R***.
4. Select DTMF Generator 1 (***DTMF***) for Modulation Source.
5. Set Modulation Type to ***FM***.
6. Set Deviation Level to ***3.50 kHz***.
7. Enter desired DTMF Code.
8. Set Mark TIme to ***70 msec***.
9. Set Space Time to ***70 msec***.
10. Set Pause Time to ***70 msec***.

4-2-7 GENERATING RF SIGNAL USING EXTERNAL MODULATION

This procedure configures the RF Generate Operation Screen to transmit a 100 MHz RF Signal FM Modulated with External Modulation Source of 1 kHz. The deviation is set for 5 kHz by adjusting the input level of the Modulation Signal. The Output Level is set to -50 dBm.

1. Set RF Field to ***100 MHz***.
2. Set Output Level to ***-50 dBm***.
3. Set Output to ***T/R***.
4. Select External Modulation (***EXT***) for Modulation Source.
5. Set Modulation Type to ***FM***.
6. Set Deviation Range to ***NAR 3***.
7. Configure RF Generate Operation Screen for active ***SCOPE***.
8. Set Oscilloscope Sweep for ***1 ms***.
9. Set Oscilloscope Source for ***Scope/DVM-AC***.
10. Connect External Modulation Source to SCOPE/DVM Connector.
11. Set External Modulation Source for 2.5 Vp. This setting will produce 5 kHz Deviation independent of signal shape.
12. Connect External Modulation Source to EXT MOD Connector.

4-2-8 GENERATING MICROPHONE MODULATED RF SIGNAL

This procedure configures the RF Generate Operation Screen to transmit a 100 MHz Microphone Modulated RF Signal at the T/R Connector. The Microphone is connected to the MIC/ACC Connector. The Output Level is set to -50 dBm.

1. Set RF Field to ***100 MHz***.
2. Set Output Level to ***-50 dBm***.
3. Set Output to ***T/R***.
4. Select Microphone (***MIC***) for Modulation Source.
5. Set Modulation Type to ***FM***.
6. Set Deviation Range to ***NAR 3***.

4-2-9 MEASURING RECEIVER CENTER FREQUENCY

This procedure configures the RF Generate Operation Screen to Measure the center frequency for a receiver.

1. Set RF Field to UUT Receiver stated Center Frequency.
2. Set Output Level to ***-50 dBm***.
3. Set Output to ***T/R***.
4. Select Audio Generator 1 (***GEN1***) for Modulation Source.
5. Set Modulation Type to ***FM***.
6. Set Deviation Level to ***3.00 kHz***.
7. Set Format to ***TONE***.
8. Set Tone Freq to ***1000.0 Hz***.
9. Set Shape to ***SINE***.
10. Connect T/R Connector to UUT Antenna Connector. Connect UUT Audio Out Connector to AUDIO/ DATA IN Connector.
11. Adjust UUT Audio Output for maximum output.
12. Measure output on AF LEVEL Meter.
13. Adjust UUT Audio Output for 60% of maximum setting
14. Set DTMF/SINAD Filter Line for ***300 Hz*** HPF and ***4 kHz*** LPF.
15. Set SINAD= to ***12 dB***.
16. Press S= On/Off Soft Function Key to activate SINAD Search Function.
17. Once 12 dB Point is reached, deactivate SINAD Search Function.
18. Adjust RF Field for highest SINAD Meter reading.
19. Final RF Field reading is UUT Center Frequency.

4-2-10 MEASURING RECEIVER SENSITIVITY

This procedure configures the RF Generate Operation Screen to measure Receiver Sensitivity.

1. Perform para 4-2-9 to determine UUT Center Frequency.
2. Set RF Field for UUT Center Frequency.
3. Set SINAD= to 10 dB or 12 dB as specified by Receiver Manufacturer.
4. Press S= On/Off Soft Function Key F6 to activate SINAD Search Function.
5. Once Level settles press S= On/Off Soft Function Key F6 to deactivate SINAD Search Function. Level is Receiver Sensitivity Level.

4-2-11 MEASURING RECEIVER SELECTIVITY

This procedure configures the RF Generate Operation Screen to measure Receiver Selectivity.

1. Perform para 4-2-9 to determine UUT Center Frequency.
2. Set RF Field for UUT Center Frequency.
3. Set Level as specified by Receiver Manufacturer.
4. Adjust UUT Squelch as high as possible but with Squelch still broken.

5. Offset RF by amount specified by Receiver Manufacturer.

6. Adjust Level until UUT squelch is broken. Difference in Original Level and adjusted Level is Receiver Selectivity.

4-2-12 MEASURING RECEIVER AUDIO OUTPUT LEVEL

This procedure configures the RF Generate Operation Screen to measure Receiver Audio Output Level.

1. Set RF Field for UUT Center Frequency.

2. Set Output Level to ***-50 dBm***.

3. Set Output to ***T/R***.

4. Select Audio Generator 1 (***GEN1***) for Modulation Source.

5. Set Modulation Type to ***FM***.

6. Set Deviation Level to ***3.00 kHz***.

7. Set Format to ***TONE***.

8. Set Tone Freq to ***1000.0 Hz***.

9. Set Shape to ***SINE***.

10. Connect T/R Connector to UUT Antenna Connector. Connect UUT Audio Out Connector to AUDIO/DATA IN Connector.

11. Adjust UUT Audio Output for desired output.

12. On Full Screen Audio Frequency Level Meter, set Range to value where bar appears.

13. Set Reading for desired units. Set Impedance for dBm reading and attach external load as required.

14. Audio Frequency Level Meter Reading is Audio Output Level of Receiver.

4-2-13 MEASURING MODULATION ACCEPTANCE BANDWIDTH

This procedure configures the RF Generate Operation Screen to measure Receiver Modulation Acceptance Bandwidth.

1. Perform para 4-2-9 to determine UUT Center Frequency.

2. Set RF Field for UUT Center Frequency.

3. Set SINAD= to 12 dB.

4. Press S= On/Off Soft Function Key F6 to activate SINAD Search Function.

5. Once Level settles press S= On/Off Soft Function Key F6 to deactivate SINAD Search Function.

6. Increase Level 6 dB.

7. Increase Deviation Level until SINAD Meter Reads 12 dB. Modulation Acceptance Bandwidth is twice Deviation Level.

4-2-14 MEASURING RECEIVER IF BANDWIDTH

This procedure configures the RF Generate Operation Screen to measure Receiver IF Bandwidth.

1. Set RF Field to UUT Receiver Center Frequency.
2. Set Output Level to ***-50 dBm***.
3. Set Output to ***T/R***.
4. Select Audio Generator 1 (***GEN1***) for Modulation Source.
5. Set Modulation Type to ***FM***.
6. Set Deviation Level to ***3.00 kHz***.
7. Set Format to ***TONE***.
8. Set Tone Freq to ***1000.0 Hz***.
9. Set Shape to ***SINE***.
10. Connect T/R Connector to UUT Antenna Connector. Connect UUT Audio Out Connector to AUDIO/DATA IN Connector.
11. Set Receiver Squelch to lowest setting.
12. Set DTMF/SINAD Filter Line for ***300 Hz*** HPF and ***4 kHz*** LPF.
13. Set SINAD= to ***12 dB***.
14. Press S= On/Off Soft Function Key to activate SINAD Search Function.
15. Once 12 dB Point is reached, deactivate SINAD Search Function. Current Level is Reference Sensitivity.
18. Increase Level by 60 dB.
19. Increase RF Field until SINAD Meter reads 12 dB. Resulting frequency is Upper Frequency.
20. Decrease RF Field past Center Frequency until SINAD Meter reads 12 dB. Resulting frequency is Lower Frequency.
21. Subtract Lower Frequency from Upper Frequency to obtain Receiver IF Bandwidth.

4-3 RF RECEIVE OPERATION

Pressing the REC MODE Key accesses the RF Receive Operation Screen. The purpose of the RF Receive Mode is for the COM-120B to act as a receiver and test a transmitter. What this section does is to provide guidance in configuring the COM-120B to perform tests on the transmitter.

This section is provided to explain how each of the active fields are edited and what selections are available. It is not designed to perform a specific test, but instead is provided as a reference for operating the RF Receive Operation Screen. Below is a list of Operations available with the RF Receive Operations Screen:

4-3-1 RF Receive Operation

4-3-2 Receiving FM Modulated RF Signal

4-3-3 Receiving AM Modulated RF Signal

4-3-4 Receiving PM Modulated RF Signal

4-3-5 Receiving DCS Coded RF Signal

4-3-6 Receiving DTMF Coded RF Signal

4-3-7 Measuring Transmitter FM Deviation

4-3-8 Measuring Transmitter AM Modulation

4-3-9 Measuring Transmitter Phase Modulation

4-3-10 Measuring Transmitter Power

4-3-11 Measuring Transmitter Frequency Error

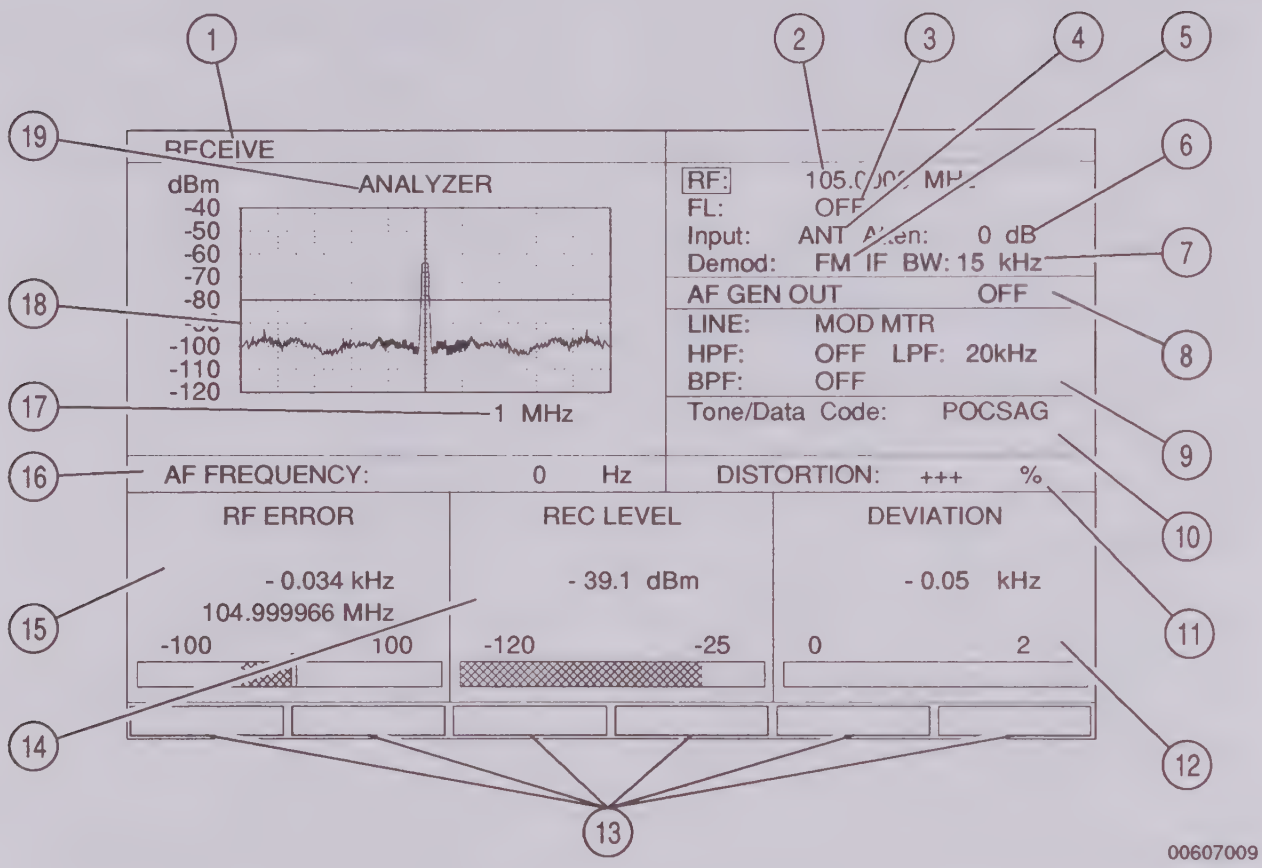
4-3-12 Measuring Transmitter Audio Frequency

4-3-13 Measuring Transmitter SINAD

4-3-14 Measuring Transmitter Distortion

4-3-1 RF RECEIVE GENERAL OPERATION

A. RF RECEIVE OPERATION SCREEN



RF Receive Operation Screen

1. Enter desired frequency in RF Field (2). Frequency range is .0000 to 1000 MHz. Activate additional functions as required as follows:

   - To operate with Δ Function active:

     - Press Δ On/Off Soft Function Key F2 until Δ prompt appears.

     - Press Δ = Soft Function Key F1 to set RF Field change increment. Range is 0 to 500 MHz. Press RETURN Soft Function Key F6 to close window.

     - To deactivate Δ Function, press Δ On/Off Soft Function Key F2 until Δ prompt no longer appears beside RF Field

   - To Operate with Scan Function, press SCAN Soft Function Key F3 to open Scan Configuration Window. Once Scan Configuration Window is opened:

- Move Cursor to From Field. Enter starting Frequency List Number.
- Move Cursor to To Field. Enter ending Frequency List Number.
- Move Cursor to Increment Field. Enter Frequency List Number Change Increment.
- Enter Pause Time or Delay Time. Range for both is 0 to 9.5 sec with .5 sec step. When Pause Time is not set to 0, Delay Time Field is blanked.
- If single sweep is desired, press SINGLE Soft Function Key F3. If continuous sweep is desired, press START Soft Function Key F1. To stop Sweep Function, press STOP Soft Function Key F2. To resume Sweep Operation once stopped, press RESUME Soft Function Key F5.
- Press RETURN Soft Function Key F6 to exit Sweep Function.

- To Operate with Sweep Operation, press SWEEP Soft Function Key F4 to open Sweep Configuration Window. Once Sweep Configuration Window is opened:
  - Move Cursor to Start Field. Enter Start Frequency.
  - Move Cursor to Stop Field. Enter Stop Frequency.
  - Move Cursor to Increment Field. Enter Increment.
  - Enter Pause Time or Delay Time. Range for both is 0 to 9.5 sec with .5 sec step. When Pause Time is not set to 0, Delay Time Field is blanked.
  - If single sweep is desired, press SINGLE Soft Function Key F3. If continuous sweep is desired, press START Soft Function Key F1. To stop Sweep Function, press STOP Soft Function Key F2. To resume Sweep Operation, once stopped, press RESUME Soft Function Key F5.
  - Press RETURN Soft Function Key F6 to exit Sweep Function.
- To Operate with RF Generate, RF Receive and Spectrum Analyer RF Frequencies locked, press LOCK/UNLOCK Soft Function Key until *L* is displayed beside RF Field and UNLOCK is displayed for F5 definition. Press UNLOCK Soft Function Key F5 to set LOCK Function off.

2. If Frequency List Operation is desired instead of entering frequency in RF Field (2), select Frequency List (3) Setting as follows:
   - Select Desired Frequency List (3) Type as follows:
     - Press T-Fwd Soft Function Key F2 to select Trunking Forward Channel List.
     - Press T-Rvs Soft Function Key F3 to select Trunking Reverse Channel List.
     - Press C-Fwd Soft Function Key F4 to select Cellular Forward Channel List.
     - Press C-Rvs Soft Function Key F5 to select Cellular Reverse Channel List.

- Press FL Soft Function Key F6 to select User Defined Frequency List.

- Press ON/OFF Soft Function Key F1 to active Frequency List (3) Setting.

- If Cellular Channel List or User Defined Frequency List is selected, select channel/ frequency number. Range of cellular channels is 1 to 1023. Range of Frequency List is 0 to 99.

- If Trunking Channel List is selected, select channel number. Select Frequency Band by moving cursor to Frequency Band Field and pressing ENTER. Select desired Frequency Band using DATA SCROLL Keys or DATA SCROLL Spinner. Press ENTER Key.

4. Select Input (4) Connector as follows:

   - Press T/R Soft Function Key F1 to select T/R Connector.

   - Press ANT Soft Function Key F2 to select ANTENNA Connector .

5. Select Attenuation (5) as follows:

   - Press 30 dB Soft Function Key F1 to select 30 dB attenuation for Input Signal.

   - Press 0 dB Soft Function Key F2 to select no attenuation for Input Signal.

6. Select Demodulation Type (5) as follows:

   - Press FM Soft Function Key F1 to select FM demodulation.

   - Press AM dB Soft Function Key F2 to select AM demodulation.

   - Press PM dB Soft Function Key F3 to select PM demodulation.

7. Select IF Bandwidth (7) as follows:

   - Press 300 kHz Soft Function Key F1 to select 300 kHz IF Bandwidth Filter.

   - Press 15 kHz Soft Function Key F2 to select 15 kHz IF Bandwidth Filter.

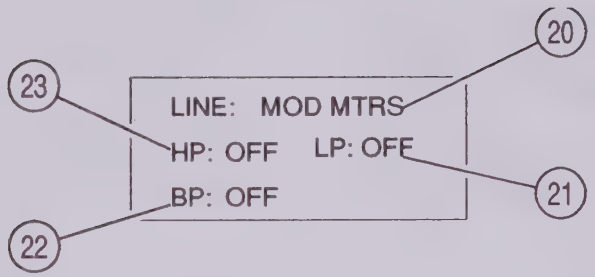
   For following guidelines, ΔF is Frequency Deviation in Hz, Φ is Phase Deviation in Radians, F_m is the Tone Modulation Frequency in Hz and IF is Minimum IF Filter Bandwidth. General Guidelines for IF Filter Selection are as follows:

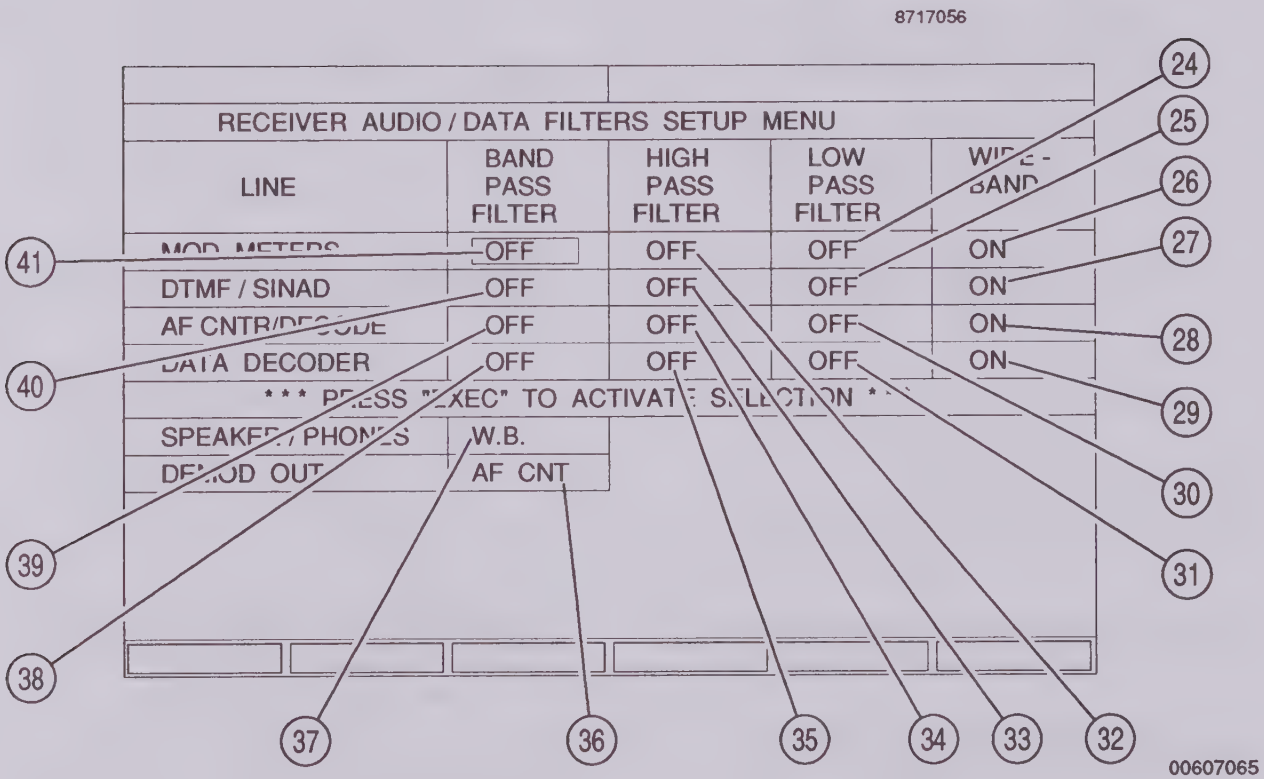
   For FM Modulated Signals:IF = $4(\Delta F + F_m)$

   For PM Modulated Signals:IF = $4F_m(\Phi + 1)$

   For AM Modulated Signals:IF = 15 kHz, for $F_m \leq 1$ kHz

8. Edit AF Generator sources as required.





9. If Audio/Data Filters are required for operation of Meters or Speaker, configure and activate as follows:

   High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot operate simultaneously on same Filter Line.

   - With cursor on Filter Line (20), press CONFIG Soft Function Key F6 to access RF Receiver Filters Menu.
   - Select MOD METERS Bandpass Filter Field (41) setting as follows:
     - Press OFF Soft Function Key F1 to set Filter to OFF.
     - Press C-MSG Soft Function Key F2 to select C-Message Weighted Filter.
   - Select MOD METERS High-Pass Filter Field (32) setting as follows:
     - Press OFF Soft Function Key F1 to set Filter to OFF.

- Press 300 Hz Soft Function Key F2 to activate 300 Hz High-Pass Filter.
- Press 4 kHz Soft Function Key F3 to activate 4 kHz High-Pass Filter.

- Select MOD METERS Low-Pass Filter Field (24) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press 300 Hz Soft Function Key F2 to activate 300 Hz Low-Pass Filter.
  - Press 4 kHz Soft Function Key F3 to activate 4 kHz Low-Pass Filter.
  - Press 20 kHz Soft Function Key F4 to activate 20 kHz Low-Pass Filter.
- Select DTMF/SINAD Bandpass Filter Field (40) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press C-MSG Soft Function Key F2 to select C-Message Weighted Filter.
- Select DTMF/SINAD High-Pass Filter Field (33) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press 300 Hz Soft Function Key F2 to activate 300 Hz High-Pass Filter.
  - Press 4 kHz Soft Function Key F3 to activate 4 kHz High-Pass Filter.
- Select DTMF/SINAD Low-Pass Filter Field (25) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press 300 Hz Soft Function Key F2 to activate 300 Hz Low-Pass Filter.
  - Press 4 kHz Soft Function Key F3 to activate 4 kHz Low-Pass Filter.
  - Press 20 kHz Soft Function Key F4 to activate 20 kHz Low-Pass Filter.
- Select AF COUNTER Bandpass Filter Field (39) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press C-MSG Soft Function Key F2 to select C-Message Weighted Filter.
- Select AF COUNTER High-Pass Filter Field (34) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press 300 Hz Soft Function Key F2 to activate 300 Hz High-Pass Filter.
  - Press 4 kHz Soft Function Key F3 to activate 4 kHz High-Pass Filter.
- Select AF COUNTER Low-Pass Filter Field (30) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.

- Press 300 Hz Soft Function Key F2 to activate 300 Hz Low-Pass Filter.
- Press 4 kHz Soft Function Key F3 to activate 4 kHz Low-Pass Filter.
- Press 20 kHz Soft Function Key F4 to activate 20 kHz Low-Pass Filter.

- Select DATA DECODER Bandpass Filter Field (38) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press C-MSG Soft Function Key F2 to select C-Message Weighted Filter.

- Select DATA DECODER High-Pass Filter Field (35) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press 300 Hz Soft Function Key F2 to activate 300 Hz High-Pass Filter.
  - Press 4 kHz Soft Function Key F3 to activate 4 kHz High-Pass Filter.

- Select DATA DECODER Low-Pass Filter Field (31) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press 300 Hz Soft Function Key F2 to activate 300 Hz Low-Pass Filter.
  - Press 4 kHz Soft Function Key F3 to activate 4 kHz Low-Pass Filter.
  - Press 20 kHz Soft Function Key F4 to activate 20 kHz Low-Pass Filter.
  - Press EXEC Soft Function Key F5 to Execute all edits.

- Select Speaker/Headphones Filter Field (37) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press C-MSG Soft Function Key F2 to select C-Message Weighted Filter.
  - Press W.B. Soft Function Key F3 to select no filtering.
  - Press AUD-GEN Soft Function Key F4 to route Audio Signal Internal Modulation Sources to Speaker.

- Select DEMOD OUT Connector Filter Field (36) setting as follows:
  - Press AF-CNT Soft Function Key F1 to access AF Counter Signal.
  - Press DET-OUT Soft Function Key F2 to access Detector Signal.
  - Press C-MSG Soft Function Key F3 to select Detector Signal through C-Message Weighted Filter.
  - Press DATA DEC Soft Function Key F4 to access Data Decoder Signal.

- Press AF DECD Soft Function Key F5 to access AF Decoder/SINAD Signal.
- Press MOD MTR Soft Function Key F6 to access Modulation Meters Signal.

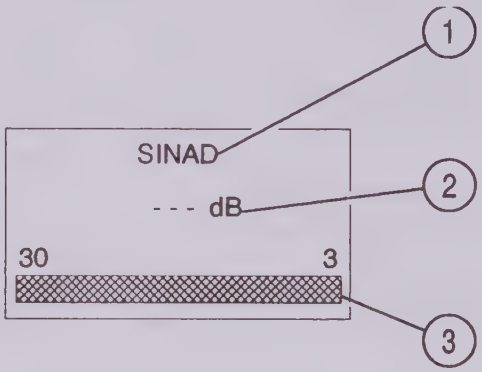
- Press RETURN Soft Function Key F6, when displayed, to return to RF Receive Operation Screen.
- To display different Filter Line (20) settings:
  - Press MENU Soft Function Key F1 to display the list of available Filter Settings.
- Select MOD MTR, DTMF SINAD, AF CNTR, DATA DEC, SPKR or DEMOD OUT Filter Setting and press ENTER.

10. Select Tone/Data Type for TONE/DATA CODE Field as required. Press DECODE Soft Function Key F2 to activate decoding.
11. Select desired DISTORTION/SINAD/MODULATION Reading (12) as follows:
    - Press SINAD Soft Function Key F2 to select SINAD Reading.
    - Press DIST Soft Function Key F3 to select DISTORTION Reading.
    - Press DEV Soft Function Key F4 to select Modulation Meter for Demodulation Type (6).
12. Select desired Meter Operation as follows:
    - Press SINAD Soft Function Key F2 to select SINAD Reading.
    - Press DIST Soft Function Key F3 to select DISTORTION Reading.
    - Press DEV Soft Function Key F4 to select Modulation Meter for Demodulation Type (6).
13. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

B. SINAD METER

The SINAD Meter for the RF Receiver measures SINAD for a 1 kHz tone demodulated from an RF Signal. Filtering, for the signal passed to the SINAD Meter, is provided by the Audio/Data Filters.

Configure and operate the SINAD Meter as follows:



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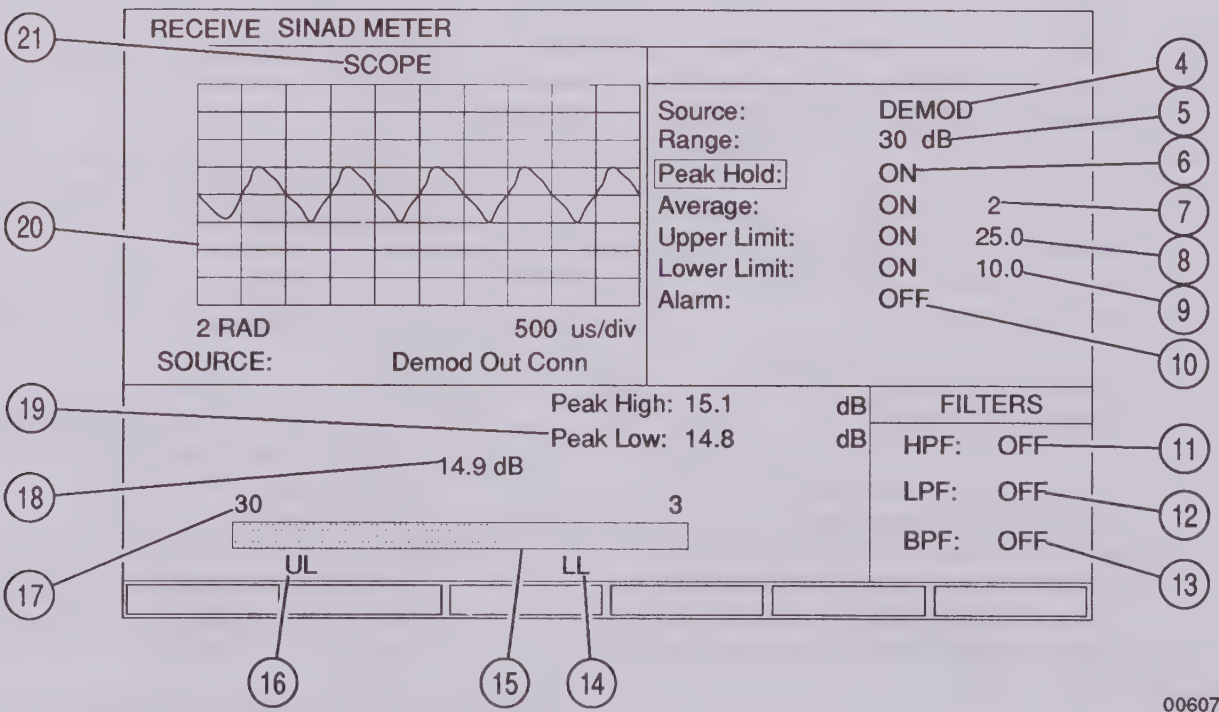

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1. With cursor on SINAD/Distortion/ Modulation Meter Label (1), press ZOOM Soft Key F1. Full Screen SINAD Meter is displayed.

2. Select Range (5) as follows:

   - Press 15 dB Soft Function Key F1 to select 15 dB Range (5).
   - Press 30 dB Soft Function Key F2 to select 30 dB Range (5).
   - Press AUTO Soft Function Key F3 to select Autorange for Range (5).

3. If Peak Hold Function is desired, do not select Autorange. Configure as follows:

   - With cursor on Peak Hold (6), press OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***OFF***.

4. If Average Function is desired, configure as follows:

   - With cursor on Average (7), press OFF/ON Soft Function Key F1 until Average (7) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (7) displays ***OFF***.

5. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (8), press OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 30.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***OFF***.

6. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (9), press OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 30.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***OFF***.

7. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (10), press OFF/ON Soft Function Key F1 until Alarm (10) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (10) displays ***OFF***.

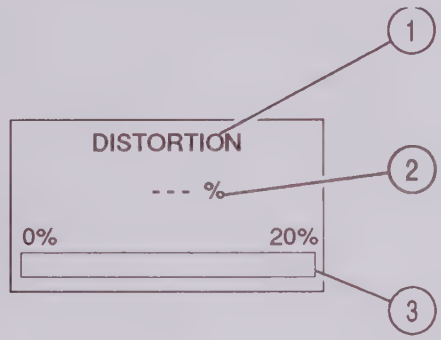
8. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

9. If displayed, press RETURN Soft Function Key F6 to return to RF Receive Operation Screen. Alternately, press REC MODE Key to return to RF Receive Operation Screen.

C. DISTORTION METER

The Distortion Meter for the RF Receiver measures Distortion for a 1 kHz tone demodulated from an RF Signal. Filtering, for the signal passed to the Distortion Meter, is provided by the Audio/Data Filters.

Configure and operate the Distortion Meter as follows:



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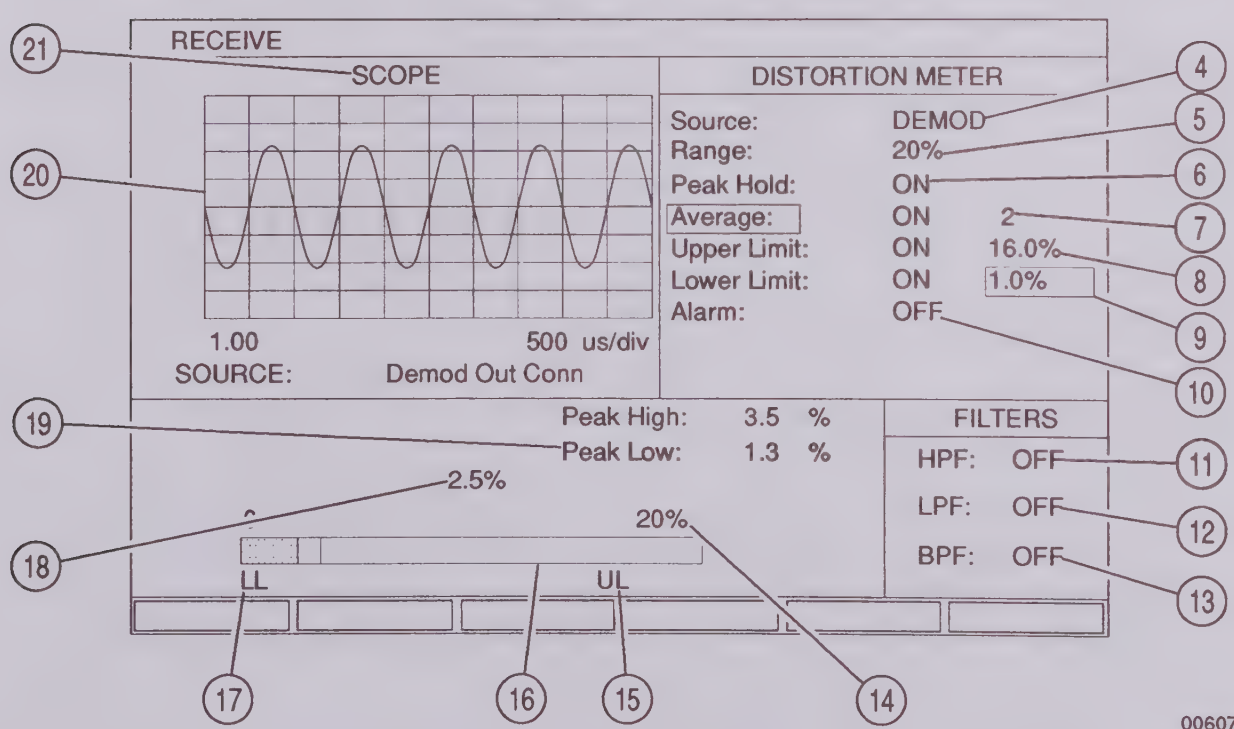

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1. With cursor on SINAD/Distortion/ Modulation Meter Label (1), press ZOOM Soft Key F1. Full Screen Distorion Meter is displayed.

2. If Peak Hold Function is desired, do not select Autorange. Configure as follows:

   - With cursor on Peak Hold (6), press OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***OFF***.

3. If Average Function is desired, configure as follows:

   - With cursor on Average (7), press OFF/ON Soft Function Key F1 until Average (7) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (7) displays ***OFF***.

4. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (8), press OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0% to 20%.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***OFF***.

5. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (9), press OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0% to 20%.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***OFF***.

6. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (10), press OFF/ON Soft Function Key F1 until Alarm (10) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (10) displays ***OFF***.

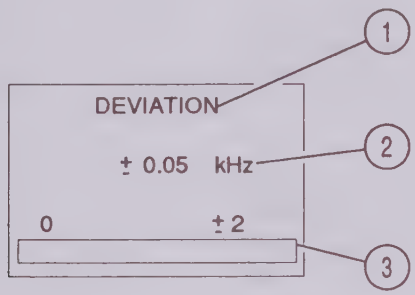
7. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

8. If displayed, press RETURN Soft Function Key F6 to return to RF Receive Operation Screen. Alternately, press REC MODE Key to return to RF Receive Operation Screen.

D. FM DEVIATION METER

The FM Deviation Meter for the RF Receiver measures FM Deviation for an RF Signal. Filtering, for the signal passed to the FM Deviation Meter, is provided by the Audio/ Data Filters.

Configure and operate the FM Deviation Meter as follows:



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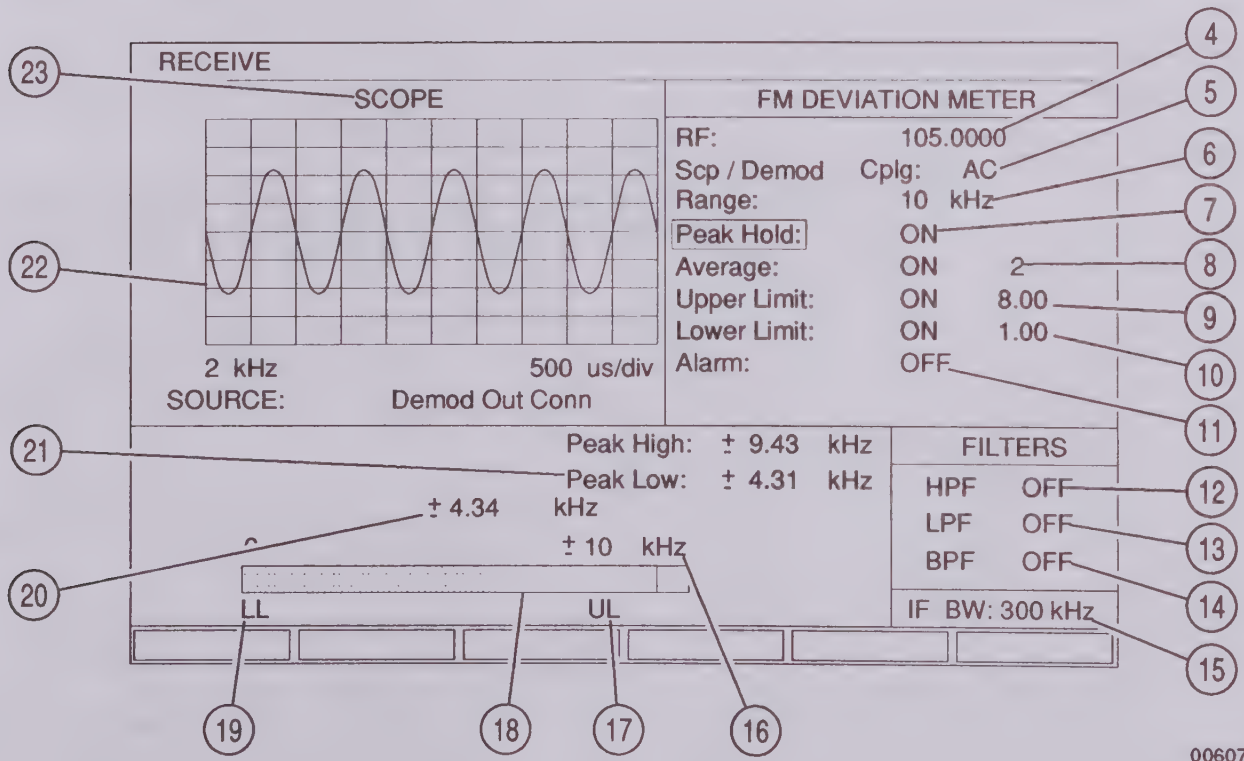

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1. With cursor on SINAD/Distortion/ Modulation Meter Label (1), press ZOOM Soft Key F1. Full Screen FM Deviation Meter is displayed.

2. Enter new frequency in RF Field (4) as needed.

3. Select Scope/DEMOD Connector Coupling (5) as follows:

   - Press AC Soft Function Key F1 to select AC Coupling
   - Press DC Soft Function Key F2 to select DC Coupling.

4. Select Range (6). Selections include Autorange, 2, 5, 10, 20, 50 or 100 kHz.

5. If Peak Hold Function is desired, do not select Autorange. Configure as follows:

   - With cursor on Peak Hold (7), press OFF/ON Soft Function Key F1 until Peak Hold (7) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (7) displays ***OFF***.

6. If Average Function is desired, configure as follows:

   - With cursor on Average (8), press OFF/ON Soft Function Key F1 until Average (8) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (8) displays ***OFF***.

7. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (9), press OFF/ON Soft Function Key F1 until Upper Limit (9) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 99.9 kHz.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (9) displays ***OFF***.

8. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (10), press OFF/ON Soft Function Key F1 until Lower Limit (10) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 99.9 kHz.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (10) displays ***OFF***.

9. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (11), press OFF/ON Soft Function Key F1 until Alarm (11) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (11) displays ***OFF***.

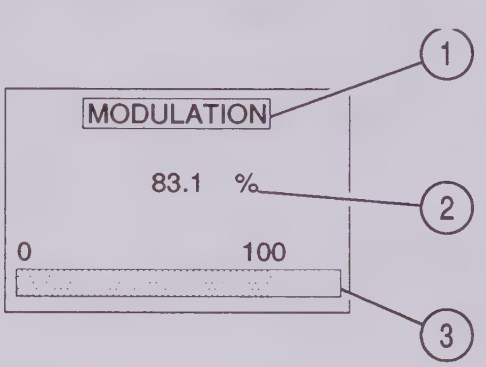
10. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

11. If displayed, press RETURN Soft Function Key F6 to return to RF Receive Operation Screen. Alternately, press REC MODE Key to return to RF Receive Operation Screen.

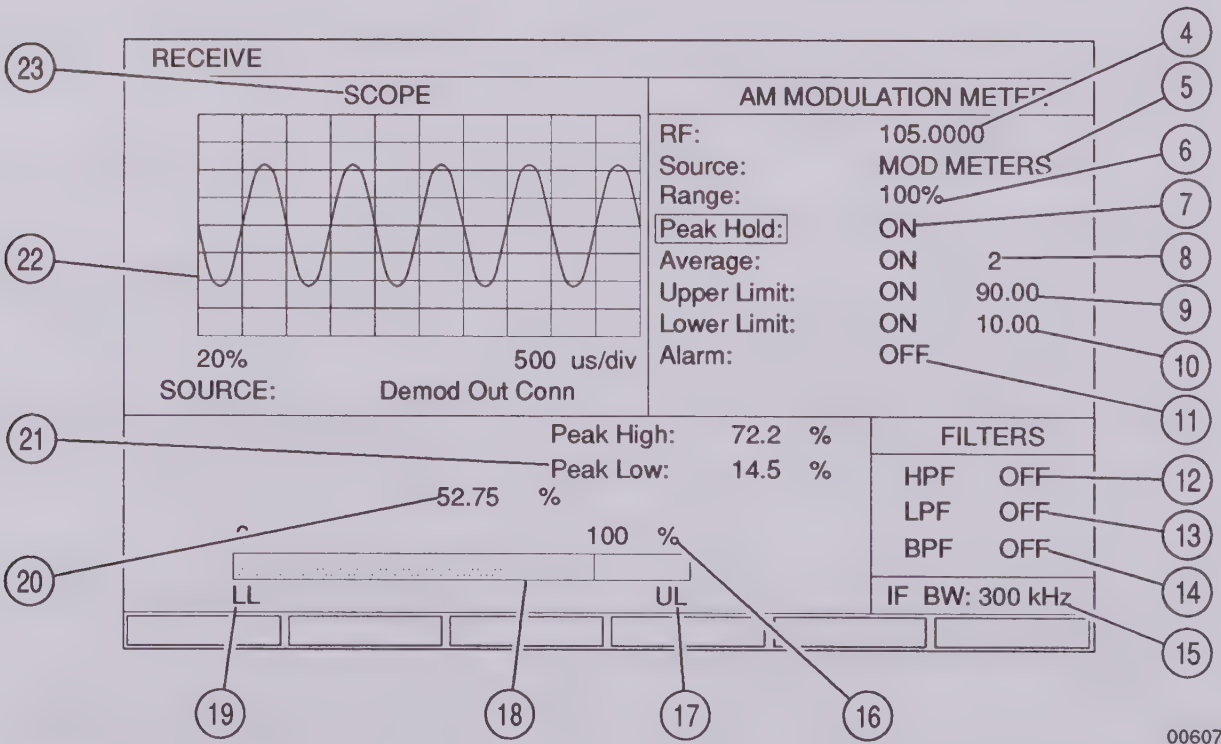
E. AM MODULATION METER

The AM Modulation Meter for the RF Receiver measures AM Modulation for an RF Signal. Filtering, for the signal passed to the AM Modulation Meter, is provided by the Audio/Data Filters.

Configure and operate the AM Modulation Meter as follows:



8717058



00607013

1. With cursor on SINAD/Distortion/ Modulation Meter Label (1), press ZOOM Soft Key F1. Full Screen AM Modulation Meter is displayed.

2. Enter new frequency in RF Field (4) as needed.

3. Select Range (6). Selections include Autorange, 40% and 100%.

4. If Peak Hold Function is desired, do not select Autorange. Configure as follows:

   - With cursor on Peak Hold (7), press OFF/ON Soft Function Key F1 until Peak Hold (7) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (7) displays ***OFF***.

5. If Average Function is desired, configure as follows:

   - With cursor on Average (8), press OFF/ON Soft Function Key F1 until Average (8) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (8) displays ***OFF***.

6. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (9), press OFF/ON Soft Function Key F1 until Upper Limit (9) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0% to 99.9%.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (9) displays ***OFF***.

7. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (10), press OFF/ON Soft Function Key F1 until Lower Limit (10) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0% to 99.9%.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (10) displays ***OFF***.

8. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (11), press OFF/ON Soft Function Key F1 until Alarm (11) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (11) displays ***OFF***.

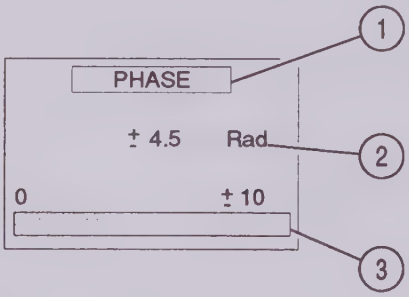
9. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

10. If displayed, press RETURN Soft Function Key F6 to return to RF Receive Operation Screen. Alternately, press REC MODE Key to return to RF Receive Operation Screen.

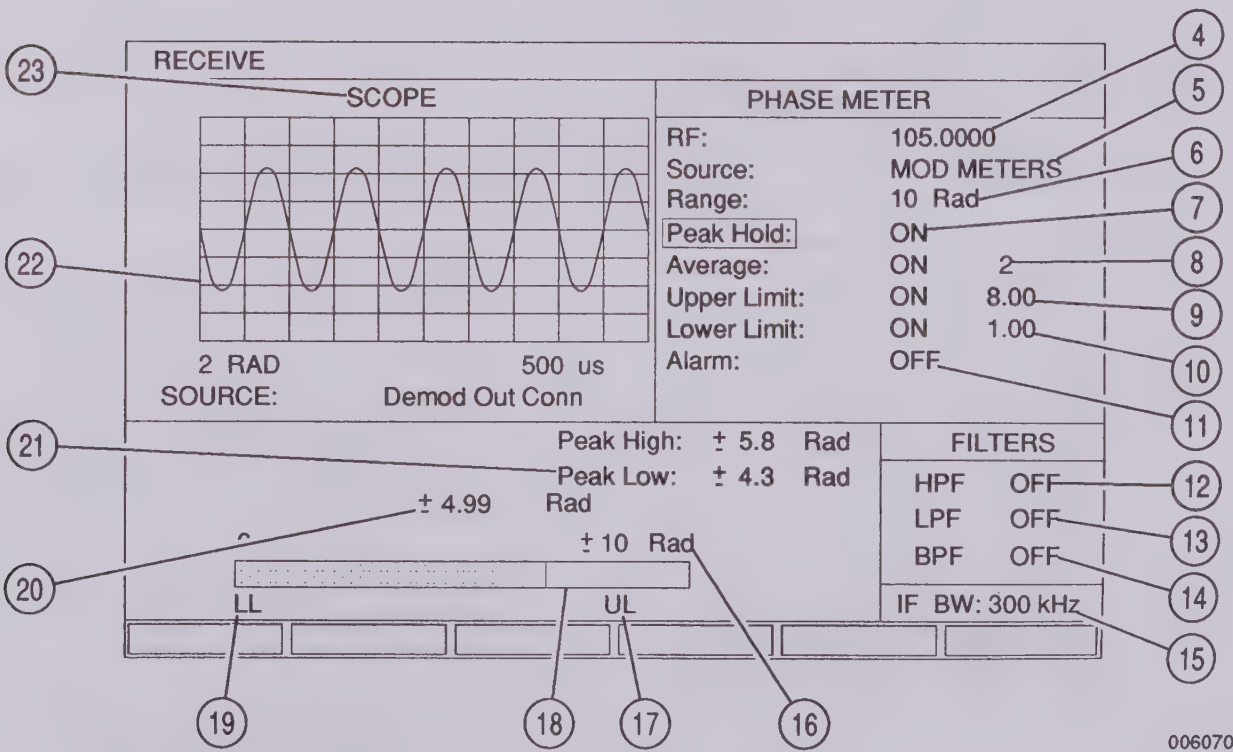
F. PHASE MODULATION METER

The Phase Modulation Meter for the RF Receiver measures Phase Deviation for an RF Signal. Filtering, for the signal passed to the Phase Modulation Meter, is provided by the Audio/Data Filters.

Configure and operate the Phase Modulation Meter as follows:



00607075



00607073

1. With cursor on SINAD/Distortion/ Modulation Meter Label (1), press ZOOM Soft Key F1. Full Screen Phase Modulation Meter is displayed.

2. Enter new frequency in RF Field (4) as needed.

3. Select Range (6). Selections include Autorange, 1, 2, 5 and 10 Radians.

4. If Peak Hold Function is desired, do not select Autorange. Configure as follows:

   - With cursor on Peak Hold (7), press OFF/ON Soft Function Key F1 until Peak Hold (7) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F2 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (7) displays ***OFF***.

5. If Average Function is desired, configure as follows:

   - With cursor on Average (8), press OFF/ON Soft Function Key F1 until Average (8) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (8) displays ***OFF***.

6. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (9), press OFF/ON Soft Function Key F1 until Upper Limit (9) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 9.99 Radians.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (9) displays ***OFF***.

7. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (10), press OFF/ON Soft Function Key F1 until Lower Limit (10) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 9.99 Radians.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (10) displays ***OFF***.

8. If Alarm Function is desired, configure as follows:

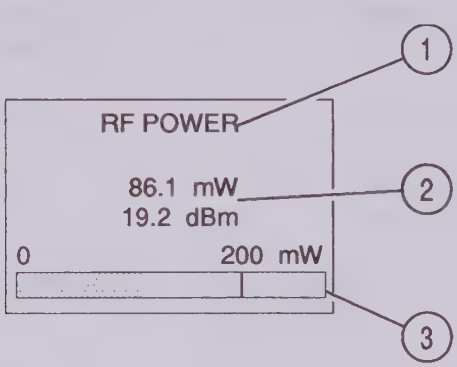
   - With cursor on Alarm (11), press OFF/ON Soft Function Key F1 until Alarm (10) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (11) displays ***OFF***.

9. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

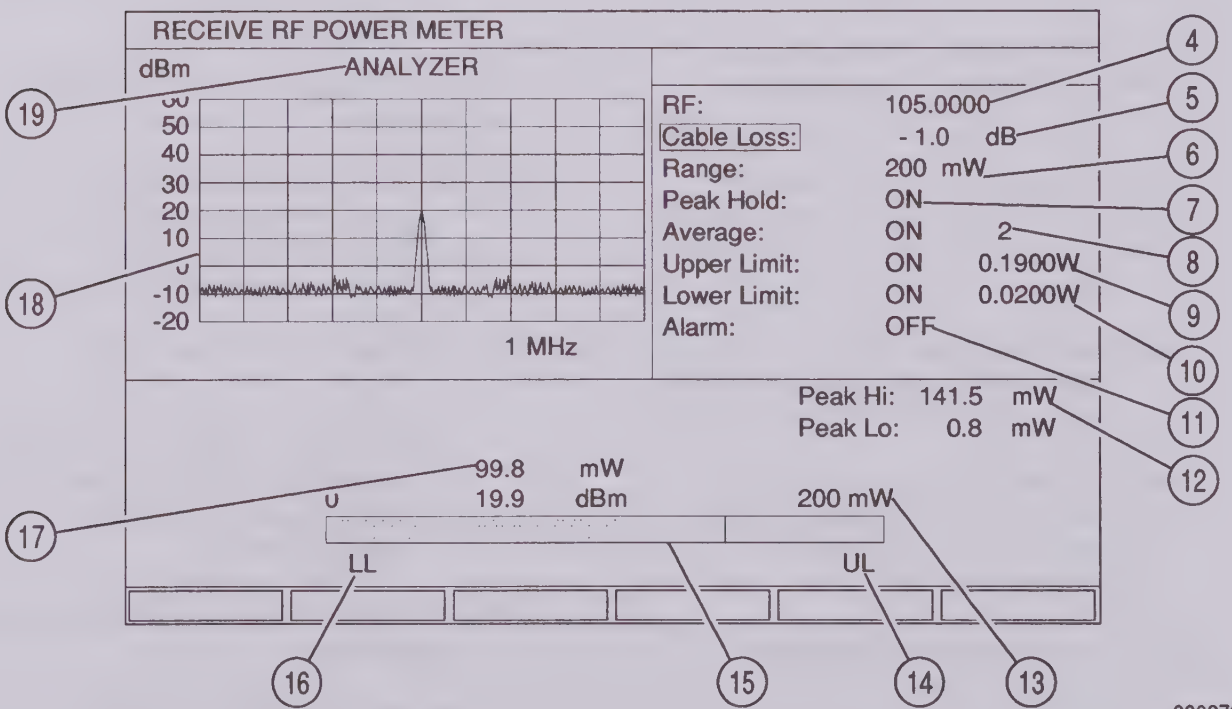
10. If displayed, press RETURN Soft Function Key F6 to return to RF Receive Operation Screen. Alternately, press REC MODE Key to return to RF Receive Operation Screen.

G. RF POWER METER

The RF Power Meter for the RF Receiver measures power of an RF Signal. Configure and operate the RF Power Meter as follows:



8717059



00607015

1. With cursor on RF Power Meter/Received Level Meter Label (1), press ZOOM Soft Key F1. Full Screen RF Power Meter is displayed.

2. Enter new frequency in RF Field (4) as needed.

3. Enter Cable Loss (5) as needed.

4. Select Range (6). Selections include Autorange and the following:

2 mW	5 mW	10 mW
20 mW	50 mW	100 mW
200 mW	500 mW	1 W
2 W	5 W	10 W
20 W	50 W	100 W
200 W		

5. If Peak Hold Function is desired, do not select Autorange. Configure as follows:

   - With cursor on Peak Hold (7), press OFF/ON Soft Function Key F1 until Peak Hold (7) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (7) displays ***OFF***.

6. If Average Function is desired, configure as follows:

   - With cursor on Average (8), press OFF/ON Soft Function Key F1 until Average (8) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (8) displays ***OFF***.

7. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (9), press OFF/ON Soft Function Key F1 until Upper Limit (9) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 200 W.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (9) displays ***OFF***.

8. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (10), press OFF/ON Soft Function Key F1 until Lower Limit (10) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 200 W.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (10) displays ***OFF***.

9. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (11), press OFF/ON Soft Function Key F1 until Alarm (10) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (11) displays ***OFF***.

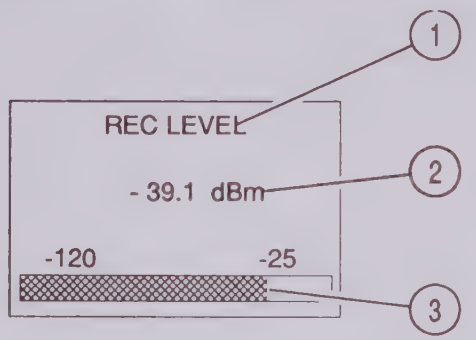
10. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

11. Once Meter is configured, press RE-ZERO Soft Function Key F3, with no signal present at T/R Connector.

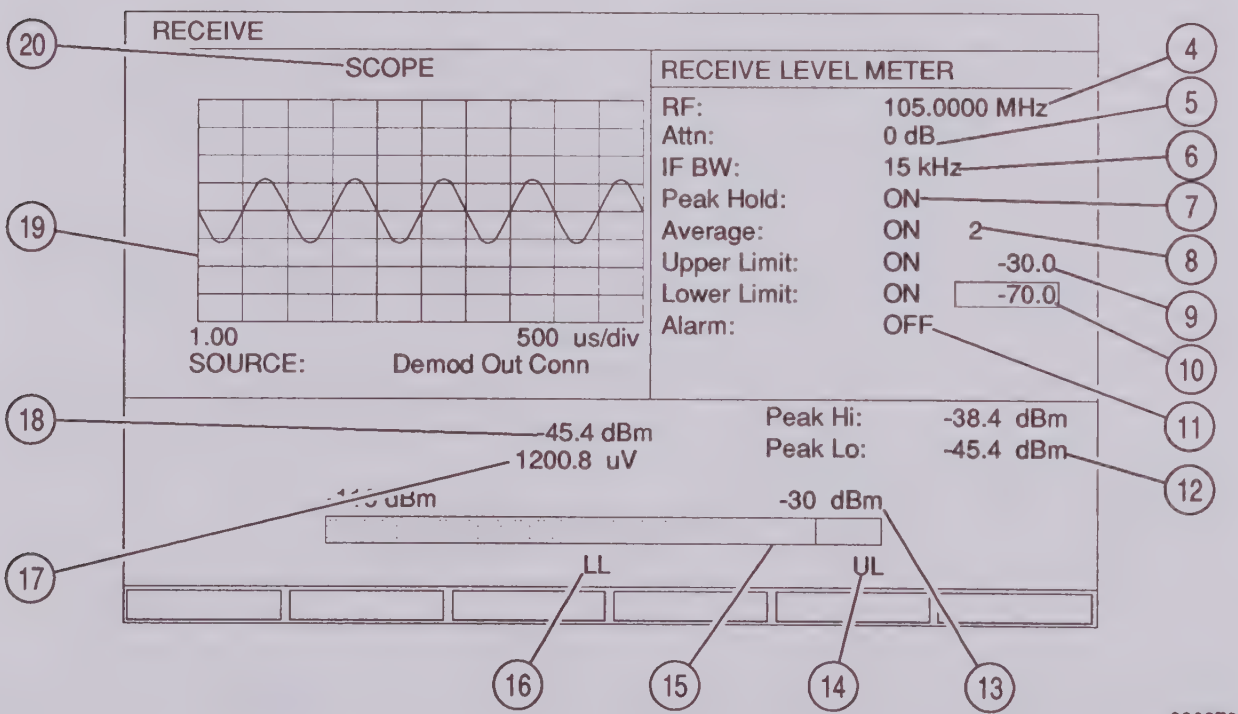
12. If displayed, press RETURN Soft Function Key F6 to return to RF Receive Operation Screen. Alternately, press REC MODE Key to return to RF Recieve Operation Screen.

H. RECEIVED LEVEL METER

The Received Level Meter for the RF Receiver measures referenced power of an RF Signal. Configure and operate the Received Level Meter as follows:



8717053



00607017

1. With cursor on RF Power Meter/ Received Level Meter Label (1), press ZOOM Soft Key F1. Full Screen Received Level Meter is displayed.

2. Enter new frequency in RF Field (4) as needed.

3. Enter new Attenuation (5) as needed. Select as follows:

   - Press 30 dB Soft Function Key F1 to select 30 dB attenuation for Input Signal.

   - Press 0 dB Soft Function Key F2 to select no attenuation for Input Signal.

4. Enter new IF Bandwidth (6) as needed. Select as follows:

   - Press 300 kHz Soft Function Key F1 to select 300 kHz IF Bandwidth Filter.

   - Press 15 kHz Soft Function Key F2 to select 15 kHz IF Bandwidth Filter.

5. If Peak Hold Function is desired, configure as follows:

   - With cursor on Peak Hold (7), press OFF/ON Soft Function Key F1 until Peak Hold (7) displays ***ON***.

   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.

   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (7) displays ***OFF***.

6. If Average Function is desired, configure as follows:

   - With cursor on Average (8), press OFF/ON Soft Function Key F1 until Average (8) displays ***ON*** and Sample Number appears.

   - Enter Sample Number. Range is 2 to 75.

   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (8) displays ***OFF***.

7. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (9), press OFF/ON Soft Function Key F1 until Upper Limit (9) displays ***ON*** and Limit Value appears.

   - Enter Limit Value. Range is -110 to -30 dBm.

   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (9) displays ***OFF***.

8. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (10), press OFF/ON Soft Function Key F1 until Lower Limit (10) displays ***ON*** and Limit Value appears.

   - Enter Limit Value. Range is -110 to -30 dBm.

   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (10) displays ***OFF***.

9. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (11), press OFF/ON Soft Function Key F1 until Alarm (10) displays ***ON***.

   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (11) displays ***OFF***.

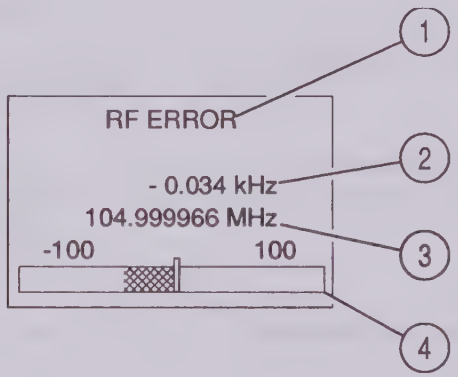
10. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

11. Once Meter is configured, Press SET LVL Soft Function Key F3 to set reference for meter. Connect coaxial cable between ANTENNA Connector and T/R Connector, when prompted. Press EXEC Soft Function Key F5 to set reference level. Press ESCAPE Soft Function Key F6 to exit without edit. SET LVL Function should be performed for each new frequency for greatest accuracy.

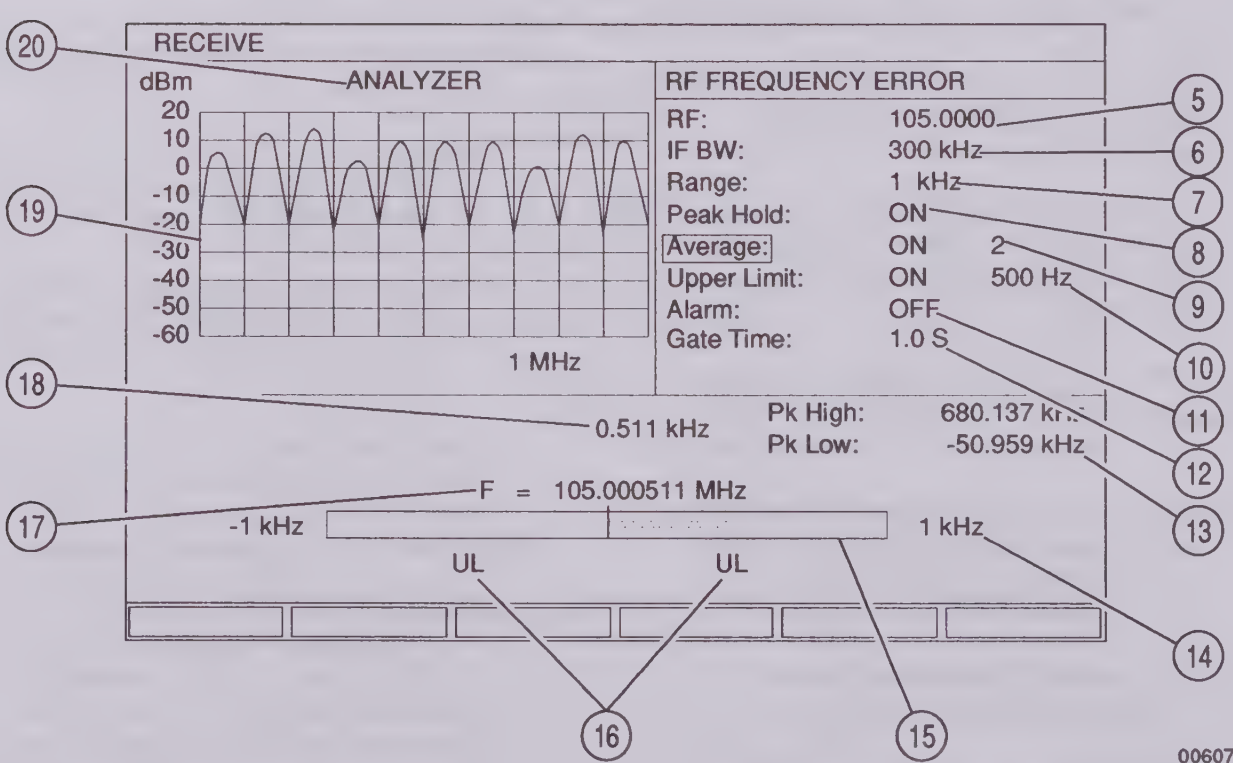
12. If displayed, press RETURN Soft Function Key F6 to return to RF Receive Operation Screen. Alternately, press REC MODE Key to return to RF Receive Operation Screen.

I. RF FREQUENCY ERROR METER

The RF Frequency Error Meter for the RF Receiver measures the frequency of the received RF Signal and reports the error. Configure and operate the RF Frequency Error Meter as follows:



8717054



00607018

- Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (9) displays *OFF*.

If Upper Limit Function is desired, configure as follows:

- With cursor on Upper Limit (10), press OFF/ON Soft Function Key F1 until Upper Limit (10) displays *ON* and Limit Value appears.
- Enter Limit Value. Range is 0 to 100,000 Hz.
- Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (10) displays *OFF*.

If Alarm Function is desired, configure as follows:

- With cursor on Alarm (11), press OFF/ON Soft Function Key F1 until Alarm (11) displays *ON*.
- Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (11) displays *OFF*.

Set Gate Time (12). Selections include Autorange, 0.1 Sec and 1.0 Sec.

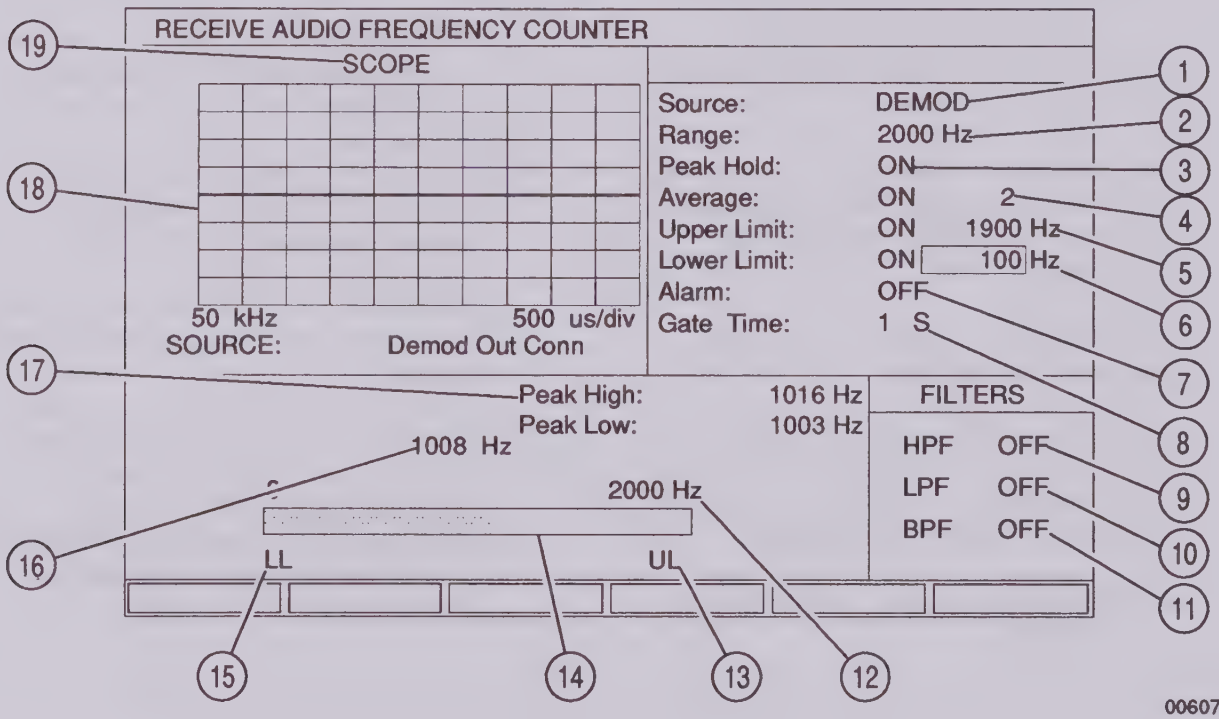
If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

If displayed, press RETURN Soft Function Key F6 to return to RF Receive Operation Screen. Alternately, press REC MODE Key to return to RF Receive Operation Screen.

J. AUDIO FREQUENCY COUNTER

The Audio Frequency Counter for the RF Receiver counts the audio frequency t~It is modulating the received RF Signal. Filtering for the signal passed to the Audio Frequency Counter is provided by the Audio/Data Filters.

Access the Full Screen Audio Frequency Counter by pressing ZOOM Soft Function Key with the cursor on the Audio Frequency Counter Reading. Configure and operate the Full Screen Audio Frequency Counter as follows:



00607019

1. Set Range (2). Selections include Autorange, 200 Hz, 2 kHz and 20 kHz.

2. If Peak Hold Function is desired, do not select Autorange. Configure as follows:

   - With cursor on Peak Hold (3), press OFF/ON Soft Function Key F1 until Peak Hold (3) displays ***ON***.

   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.

   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (3) displays ***OFF***.

3. If Average Function is desired, configure as follows:

   - With cursor on Average (4), press OFF/ON Soft Function Key F1 until Average (4) displays ***ON*** and Sample Number appears.

   - Enter Sample Number. Range is 2 to 10.

- Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (4) displays ***OFF***.

4. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (5), press OFF/ON Soft Function Key F1 until Upper Limit (5) displays ***ON*** and Limit Value appears.

   - Enter Limit Value. Range is 0 to 20000 Hz.

   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (5) displays ***OFF***.

5. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (6), press OFF/ON Soft Function Key F1 until Lower Limit (6) displays ***ON*** and Limit Value appears.

   - Enter Limit Value. Range is 0 to 20000 Hz.

   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (6) displays ***OFF***.

6. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (7), press OFF/ON Soft Function Key F1 until Alarm (10) displays ***ON***.

   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (7) displays ***OFF***.

7. Set Gate Time (8). Selections include 1 and 10 seconds.

8. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

9. If displayed, press RETURN Soft Function Key F6 to return to RF Receive Operation Screen. Alternately, press REC MODE Key to return to RF Receive Operation Screen.

K. OSCILLOSCOPE OPERATION SCREEN

The RF Receive Oscilloscope is usable as an abbreviated Oscilloscope and as a Full Screen Oscilloscope. Configuring one is reflected in the other.

The abbreviated Oscilloscope, as shown below, is visible from the RF Receive Operation Screen and the following meters:

SINAD Meter Operation Screen
Distortion Meter Operation Screen
FM Deviation Meter Operation Screen
Phase Modulation Meter Operation Screen
RF Power Meter Operation Screen
Received Level Meter Operation Screen
RF Frequency Error Meter Operation Screen
Audio Frequency Counter Operation Screen

Parameters set on any of the Operation Screens are reflected in all. Configuring the abbreviated Oscilloscope is as follows:

1. Select Sweep (3). Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

Press ROLL Soft Function Key F2 to view the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher. Press SLOW Soft Function Key F2 to return to the normal mode of operation.

2. Select SCOPE SOURCE (4). Selections include:

SCOPE SOURCE (4)	Signal Input	Signal Type
Scope/DVM-GND	SCOPE/DVM Connector	External Ground-Coupled Signal
Scope/DVM-AC	SCOPE/DVM Connector	External AC-Coupled Signal
Scope/DVM-DC	SCOPE/DVM Connector	External DC-Coupled Signal
AF Cntr	Audio Frequency Counter Signal	Demodulated Signal passed through filters to Audio Frequency Counter.
Notch Residual	Internal Filtered Signal	Notch Filtered Signal passed to SINAD and Distortion Meters. Reading is relative with no units applied.
Audio/Data/Gen Out	AUDIO/DATA OUT Connector	Composite signal of Audio/Data Generators
DTMF/SINAD	Signal applied to Audio Frequency Decoder, SINAD and Distortion Meters	Demodulated Signal passed through filters to Audio Frequency Decoder, SINAD and Distortion Meters
Data Decoder	Signal applied to Data Decoder	Demodulated Signal passed through filters to Data Decoder
RF Power	RF Power Meter Input	Relative to detected signal applied to RF Power Meter
Detector Out	Demodulated Audio	Unfiltered Demodulated Signal
Demod Out Connector	DEMOD Connector	Filtered Demodulated Signal applied to DEMOD Connector
Mod Meters	Modulation Meters source	Filtered Demodulated Signal applied to selected Modulation Meter.

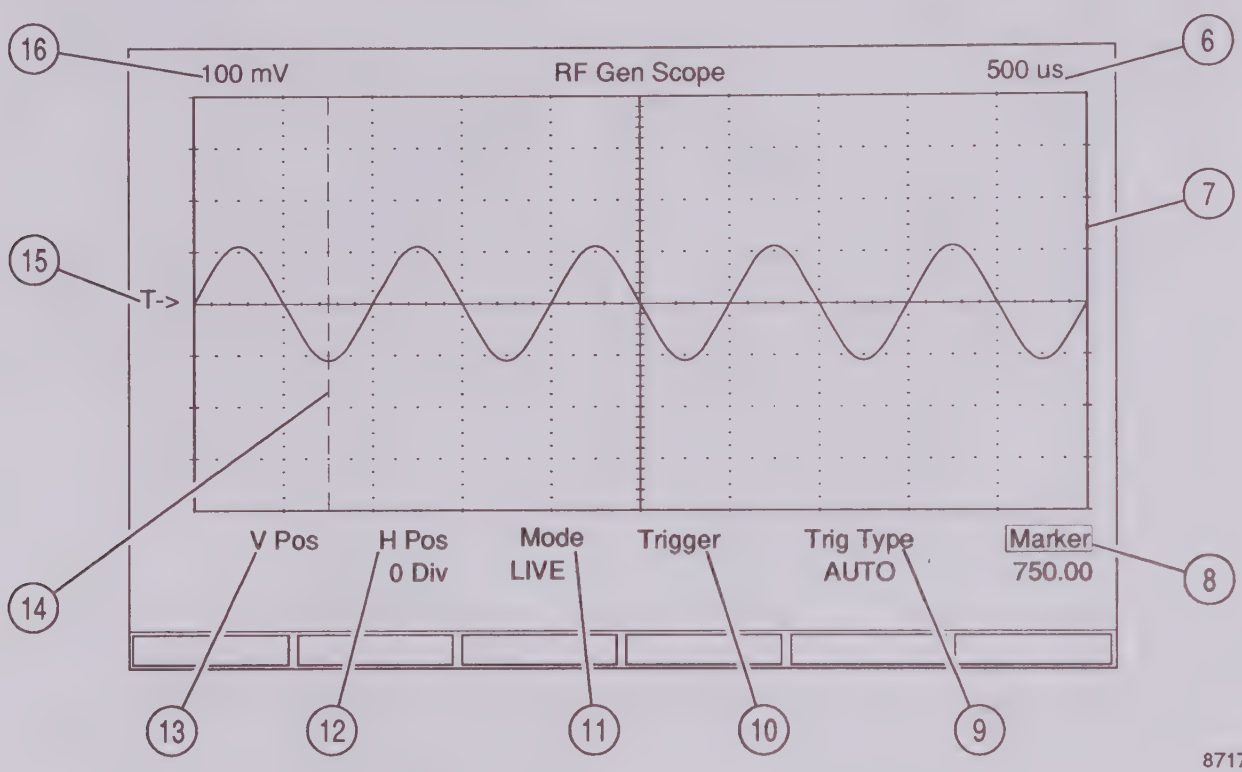
3. Select Oscilloscope Scale. Selections include:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
AF Cntr	0.02, 0.04, 0.10, 0.20, 0.40, 1.00

SCOPE SOURCE (4)	Available Scales
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data/Gen Out	20, 40, 100, 200, 400 mV 1 V
DTMF/SINAD	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
Data Decoder	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
RF Power	Low, Med, High (Selection is automatic depending on power provided to T/R Connector)

SCOPE SOURCE (4)	Available Scales
Detector Out	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
Demod Out Connector	.02, .04, .1, .2, .4, 1.00
Mod Meters	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians

Pressing ZOOM Soft Function Key F1 accesses full screen Oscilloscope, when cursor is on SCOPE/ANALYZER Prompt (1) of RF Receive Operation Screen and abbreviated Oscilloscope is displayed. Scope Source (4) must be selected before Full Screen Oscilloscope is accessed. Configuring the full screen Oscilloscope is as follows:



1. Select Sweep (6). Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

   - Press ROLL Soft Function Key F2 to view the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.
   - Press SLOW Soft Function Key F2 to return to the normal mode of operation.

2. Select Trigger Type (9) as follows:
   - Press NORM Soft Function Key F1 to select Normalized Trigger.
   - Press AUTO Soft Function Key F2 to select Auto Trigger.
   - Press 1 SHOT Soft Function Key F3 to select One Shot Trigger. Press 1 SHOT Soft Function Key F3 as needed to reset Trigger.

3. Set Trigger (10) using DATA SCROLL Spinner or DATA SCROLL Keys. Trigger Level (15) displays level required to trigger Oscilloscope in 1 SHOT or NORM.

4. Select Operation Mode as follows:
   - Press LIVE Soft Function Key F2 to select Live Operation Mode.
   - Press AVG Soft Function Key F3 to select Average Operation Mode.

- Press COMPARE Soft Function Key F4 to select Compare Operation Mode.
- Press RECALL Soft Function Key F5 to select Recall Operation Mode.
- Press STORE Soft Function Key F6 to select Store Operation Mode.

5. Select H POS (12) Offset as needed. Range is -10 to 10 Divisions.

6. Set Vertical Position of trace as needed by accessing V POS (13) and editing with DATA SCROLL Keys or DATA SCROLL Spinner.

7. Select Oscilloscope Scale (16). Selections available are dependent on Scope Source (4). Selections include:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
AF Cntr	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data/Gen Out	20, 40, 100, 200, 400 mV 1 V
AF Dec/SINAD	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
Data Decoder	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
RF Power	Low, Med, High (Selection is automatic depending on power provided to T/R Connector)
Detector Out	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
Demod Out Connector	.02, .04, .1, .2, .4, 1.00
Mod Meters	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians

8. Activate Marker (14), as required, as follows:
   - With Cursor on Marker Position (8), press On/Off Soft Function Key F1.
   - Enter Desired Marker Position using DATA ENTRY Keys or DATA SCROLL Keys and/or DATA SCROLL Spinner.

L. SPECTRUM ANALYZER OPERATION SCREEN

The RF Receive Spectrum Analyzer is usable as an abbreviated Spectrum Analyzer or as a Full Screen Spectrum Analyzer. Configuring one is reflected in the other.

The abbreviated Spectrum Analyzer, as shown below, is visible from the RF Receive Operation Screen and the following Meters:

SINAD Meter Operation Screen
Distortion Meter Operation Screen
FM Deviation Meter Operation Screen
AM Modulation Meter Operation Screen
Phase Modulation Meter Operation Screen
RF Power Meter Operation Screen
Received Level Meter Operation Screen
RF Frequency Error Meter Operation Screen
Audio Frequency Counter Operation Screen

Parameters set on any of the above Operation Screens are reflected in all. Configuring the abbreviated Spectrum Analyzer is as follows:

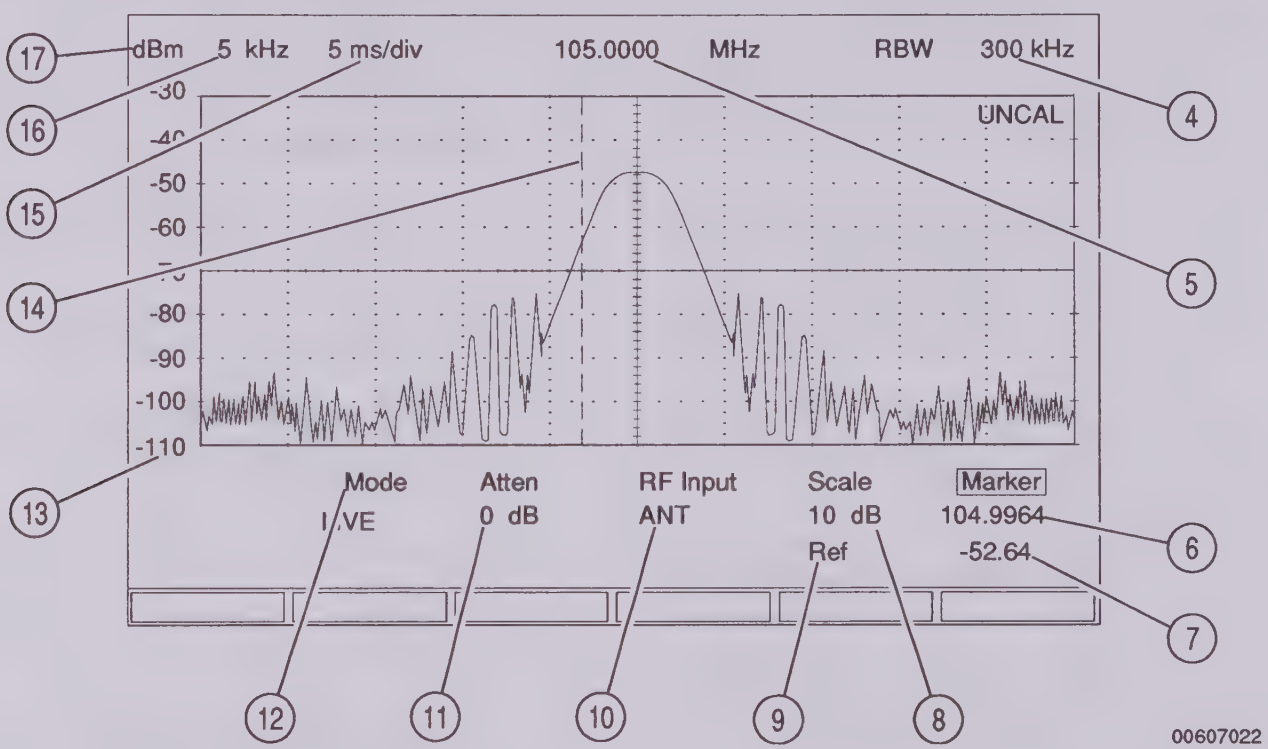
1. Select Scan Width (3). Selections include zero scan and:

1 kHz	2 kHz	5 kHz
10 kHz	20 kHz	50 kHz
100 kHz	200 kHz	500 kHz
1 MHz		

Press MENU Soft Function Key F1 to access a scan width menu. Press RETURN Soft Function Key F6 to exit to normal operation.

Press CONFIG Soft Function Key F2 to access a pop up screen to configure scan width. Press COUPLE Soft Function Key F1 to set the sweep and RBW to factory default state for the current scan width. Press RETURN Soft Function Key F6 to exit to normal operation.

Pressing ZOOM Soft Function Key F1 accesses full screen Spectrum Analyzer, when cursor is on SCOPE/ANALYZER Prompt (1) of RF Receive Operation Screen and abbreviated Spectrum Analyzer is displayed. Available features and parameters are described below:



1. Set Center Frequency (5). Press Set Ref Soft Function Key F1 if current Center Frequency is to used as Reference Frequency.

2. Select Scan Width (15). Selections include zero scan and:

1 kHz	2 kHz	5 kHz
10 kHz	20 kHz	50 kHz
100 kHz	200 kHz	500 kHz
1 MHz	2 MHz	5 MHz
10 MHz	20 MHz	50 MHz
100 MHz		

3. Set Logarithmic Function (16) as follows:

   - Press dBm Soft Function Key F1 to select dBm.
   - Press dBµV Soft Function Key F2 to select dBµV.
   - Press dBmV Soft Function Key F3 to select dBmV.
   - Press dBV Soft Function Key F4 to select dBV.
   - Press dBµW Soft Function Key F5 to select dBµW.
   - Press dBW Soft Function Key F6 to select dBW.

4. Set Scale (8) as follows:

   - Press 10 dB Soft Function Key F1 to select 10 dB for Vertical Scale (13).

- Press 2 dB Soft Function Key F2 to select 2 dB for Vertical Scale (13).

5. Select Mode (12) as follows:

   - Press PKHOLD Soft Function Key F1 to select Peak Hold Operation Mode.

   - Press LIVE Soft Function Key F2 to select Live Operation Mode.

   - Press AVG Soft Function Key F3 to select Average Operation Mode.

   - Press COMPARE Soft Function Key F4 to select Compare Operation Mode.

   - Press RECALL Soft Function Key F5 to select Recall Operation Mode.

   - Press STORE Soft Function Key F6 to select Store Operation Mode.

6. Activate Marker (14), as required, as follows:

   - With Cursor on Marker Position (6), press On/Off Soft Function Key F1.

   - Enter Desired Marker Position using DATA ENTRY Keys or DATA SCROLL Keys and/or DATA SCROLL Spinner.

7. Access Ref (9) Field to adjust Vertical Scale (13), as needed.

8. Select RF Input (10) as needed.

   - Press T/R Soft Function Key F1 to select T/R Connector.

   - Press ANT Soft Function Key F2 to select ANTENNA Connector.

9. Select Attenuation (11) as needed.

   - Press 30 dB Soft Function Key F1 to select 30 dB Attenuation.

   - Press 0 dB Soft Function Key F2 to select 0 dB Attenuation.

10. If Scan Width (15) is set to zero scan, enter Zero Scan Sweep (17). Selections Include:

200 µs/div	500 µs/div	1 ms/div
2 ms/div	5 ms/div	10 ms/div
20 ms/div	50 ms/div	100 ms/div
200 ms/div	500 ms/div	

   - Press MENU Soft Function Key F1 to access the sweep menu. Press RETURN to exit into normal operation.

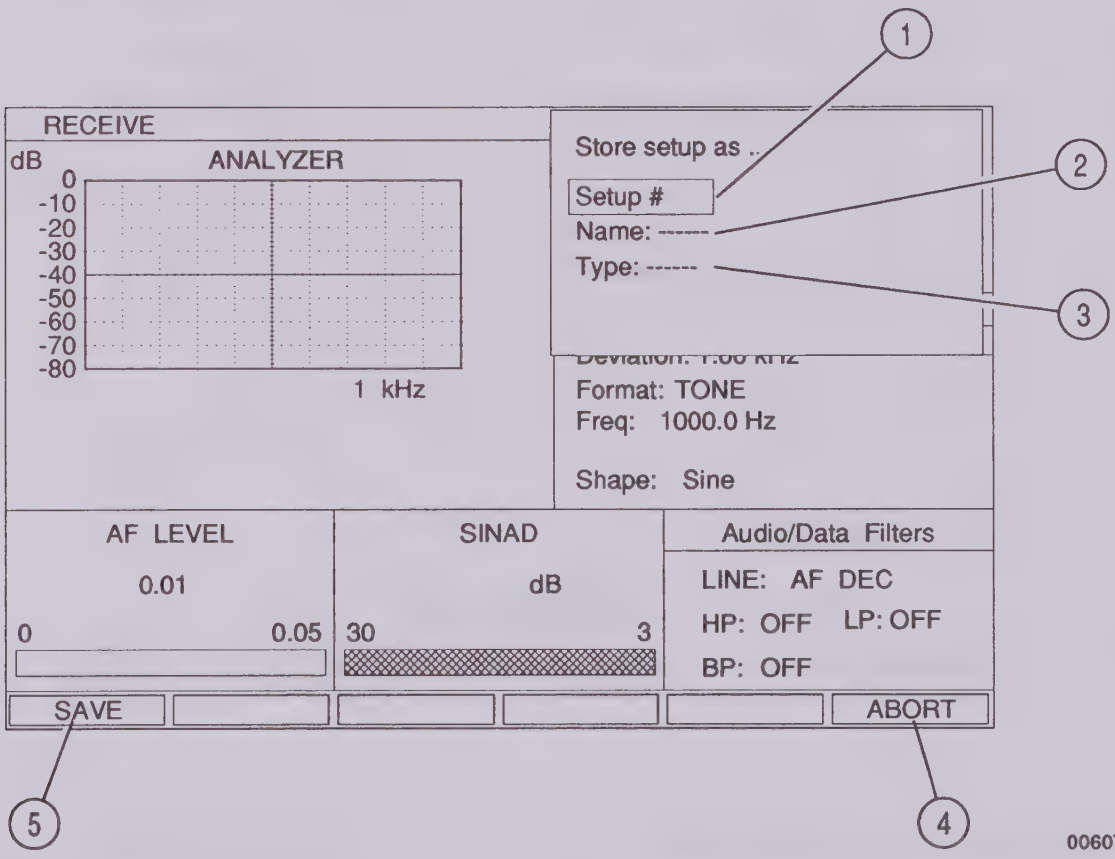
   - Press DEFLT Soft Function Key F5 to set only the current field to factory default.

   - Press COUPLE Soft Function Key to set the sweep and RBW to factory default state for the current scan width.

M. STORE AND RECALL OPERATION

Pressing STORE Memory Key allows the operator to store up to 100 RF Receive Operation Screen configurations. Storage Locations 0 through 49 can be used to store a RF Generate Operation configuration, a RF Receive Operation configuration or a Duplex Operation configuration (Receive and Generate pair).

STORE Operation for the RF Receive Operation is as follows:



1. Press STORE MEMORY Key.

2. Enter Setup # (1) value. Range is 0 to 49. Press ENTER Key.

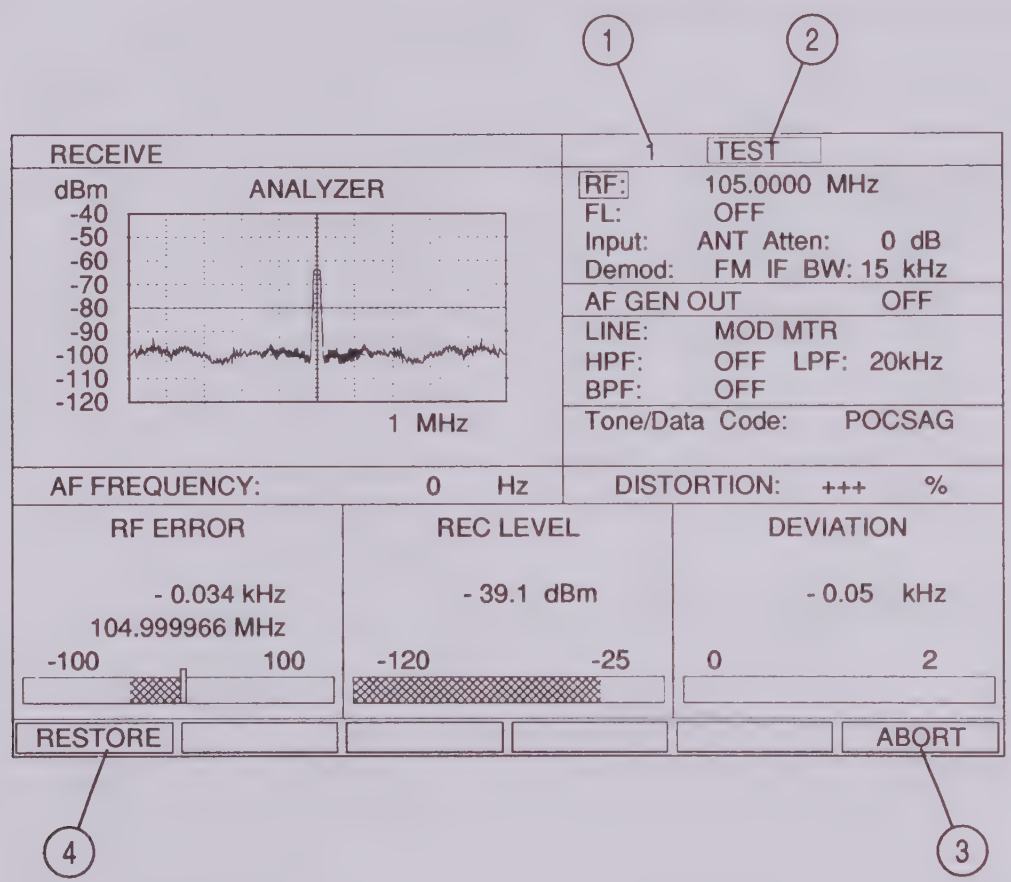
3. If Name (2) is desired, press ENTER Key, with Cursor on Memory Location Label (2) field. Enter Label using DATA ENTRY Keys. Label can be alphabetic and/or numeric characters. Press ENTER Key.

4. Type (3) displays the type of data saved in the specified setup number. Types to save and recall are: DUPLEX, GENERATOR, RECEIVER and EMPTY.

5. Press SAVE Soft Function Key F1 (5) to accept selections and save Setup. Press ABORT Soft Function Key F6 (4) to escape without saving Setup.

Pressing RCL Memory Key allows the operator to recall up to 50 previously stored operation screens. RF Receive, RF Generate or Duplex Operation Screen configurations can all be accessed from the RF Generate Operation Screen. Accessing anything other than an RF Generate Operation Screen configuration, automatically switches the COM-120B to the selected mode of operation.

RECALL Operation for the RF Receive Operation is as follows:



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1. Press RECALL MEMORY Key.

2. Enter Setup # (1) value. Range is 0 to 49. Press ENTER Key.

3. Press RESTORE Soft Function Key F1 (4) to accept selections and recall Setup. Press ABORT Soft Function Key F6 (3) to escape without recalling Setup.

4. Type (3) displays the type of data saved in the specified setup number. Types to save and recall are: DUPLEX, GENERATOR, RECEIVER and EMPTY.

5. Press RESTORE Soft Function Key F1 (5) to accept selections and save Setup. Press ABORT Soft Function Key F6 (4) to escape without recalling Setup.

4-3-2 RECEIVING FM MODULATED RF SIGNAL

This procedure configures the RF Receive Operation Screen to receive a 100 MHz Frequency Modulated RF Signal at the ANTENNA Connector. The transmitted signal has 5 kHz deviation of a 1 kHz sine wave at -60 dBm level. The speaker is configured to play the demodulated signal.

1. Set RF Field to ***100 MHz***.
2. Set Input Connector to ***ANT***.
3. Set Attenuation to ***0 dB***.
4. Set Demodulation Type to ***FM***.
5. Set IF Bandwidth to ***300 kHz***.
6. Access Filters Setup Menu.
7. Set Mod Meter Filter Line Low-Pass Filter to ***20 kHz***.
8. Set AF Counter Filter Line Low-Pass Filter to ***4 kHz***.
9. Set Speaker/Headphones Filter Line to ***W.B.*** (Wideband).
10. Return to RF Receive Operation Screen.
11. Adjust VOLUME Control for desired audio level.

4-3-3 RECEIVING AM MODULATED RF SIGNAL

This procedure configures the RF Receive Operation Screen to receive a 100 MHz Amplitude Modulated RF Signal at the ANTENNA Connector. The transmitted signal has 40% Modulation Rate of a 1 kHz sine wave at -60 dBm level. The speaker is configured to play the demodulated signal.

1. Set RF Field to ***100 MHz***.
2. Set Input Connector to ***ANT***.
3. Set Attenuation to ***0 dB***.
4. Set Demodulation Type to ***AM***.
5. Set IF Bandwidth to ***300 kHz***.
6. Access Filters Setup Menu.
7. Set Mod Meter Filter Line Low-Pass Filter to ***20 kHz***.
8. Set AF Counter Filter Line Low-Pass Filter to ***4 kHz***.
9. Set Speaker/Headphones Filter Line to ***W.B.*** (Wideband).
10. Return to RF Receive Operation Screen.
11. Adjust VOLUME Control for desired audio level.

4-3-4 RECEIVING PM MODULATED RF SIGNAL

This procedure configures the RF Receive Operation Screen to receive a 100 MHz Phase Modulated RF Signal at the ANTENNA Connector. The transmitted signal has 5 Radians deviation of a 1 kHz sine wave at -60 dBm level. The speaker is configured to play the demodulated signal.

1. Set RF Field to ***100 MHz***.
2. Set Input Connector to ***ANT***.
3. Set Attenuation to ***0 dB***.
4. Set Demodulation Type to ***PM***.
5. Set IF Bandwidth to ***300 kHz***.
6. Access Filters Setup Menu.
7. Set Mod Meter Filter Line Low-Pass Filter to ***20 kHz***.
8. Set AF Counter Filter Line Low-Pass Filter to ***4 kHz***.
9. Set Speaker/Headphones Filter Line to ***W.B.*** (Wideband).
10. Return to RF Receive Operation Screen.
11. Adjust VOLUME Control for desired audio level.

4-3-5 RECEIVING DCS CODED RF SIGNAL

This procedure configures the RF Receive Operation Screen to receive a 100 MHz RF Signal FM Modulated with a DCS Code at the ANTENNA Connector. The deviation is 5 kHz.

1. Set RF Field to ***100 MHz***.
2. Set Input Connector to ***ANT***.
3. Set Attenuation to ***0 dB***.
4. Set Demodulation Type to ***FM***.
5. Set IF Bandwidth to ***300 kHz***.
6. Access Filters Setup Menu.
7. Set Mod Meter Filter Line Low-Pass Filter to ***20 kHz***.
8. Set AF Counter Filter Line Low-Pass Filter to ***4 kHz***.
9. Set Speaker/Headphones Filter Line to ***W.B.*** (Wideband).
10. Return to RF Receive Operation Screen.
11. Tone/Data Code Field to ***DCS***.

4-3-6 RECEIVING DTMF CODED RF SIGNAL

This procedure configures the RF Receive Operation Screen to receive a 100 MHz RF Signal FM Modulated with DTMF Code at the ANTENNA Connector. The deviation is set for 5 kHz. The signal is set to run in a continuous loop.

1. Set RF Field to ***100 MHz***.
2. Set Input Connector to ***ANT***.
3. Set Attenuation to ***0 dB***.
4. Set Demodulation Type to ***FM***.
5. Set IF Bandwidth to ***300 kHz***.
6. Access Filters Setup Menu.
7. Set Mod Meter Filter Line Low-Pass Filter to ***20 kHz***.
8. Set AF Counter Filter Line Low-Pass Filter to ***4 kHz***.
9. Set Speaker/Headphones Filter Line to ***W.B.*** (Wideband).
10. Return to RF Receive Operation Screen.
11. Set Tone/Data Code Type to ***DTMF***.
12. Connect Generator to ANTENNA Connector.

4-3-7 MEASURING TRANSMITTER FM DEVIATION

This procedure configures the RF Receive Operation Screen to measure the FM Deviation of an RF Signal. The signal being measured is a 100 MHz FM Modulated signal with a 12 kHz tone and 50 kHz deviation. Signal is applied at the T/R Connector.

1. Set RF Field to ***100 MHz***.
2. Set Input Connector to ***T/R***.
3. Set Attenuation to ***0 dB***.
4. Set Demodulation Type to ***FM***.
5. Set IF Bandwidth to ***300 kHz***.
6. Access Filters Setup Menu.
7. Set Mod Meter Filter Line Low-Pass Filter to ***OFF***.
8. Configure RF Receive Operation Screen to display FM Deviation Meter. Access Full Screen FM FM DeviationDeviation Meter.
9. Set Range to ±100 kHz.
10. Set Peak Hold, Average, Upper Limit, Lower Limit and Alarm as required.
11. Return to RF Receive Operation Screen.
12. Apply signal to T/R Connector.

4-3-8 MEASURING TRANSMITTER AM MODULATION

This procedure configures the RF Receive Operation Screen to measure the AM Modulation of an RF Signal. The signal being measured is a 100 MHz AM Modulated signal with a 12 kHz tone and 30% Modulation. Signal is applied at the T/R Connector.

1. Set RF Field to ***100 MHz***.
2. Set Input Connector to ***T/R***.
3. Set Attenuation to ***0 dB***.
4. Set Demodulation Type to ***AM***.
5. Set IF Bandwidth to ***300 kHz***.
6. Access Filters Setup Menu.
7. Set Mod Meter Filters to ***OFF***.
8. Configure RF Receive Operation Screen to display AM Modulation Meter. Access Full Screen AM Modulation Meter.
9. Set Range to ***40%***.
10. Set Peak Hold, Average, Upper Limit, Lower Limit and Alarm as required.
11. Return to RF Receive Operation Screen.
12. Apply signal to T/R Connector.

4-3-9 MEASURING TRANSMITTER PHASE MODULATION

This procedure configures the RF Receive Operation Screen to measure the Phase Modulation of an RF Signal. The signal being measured is a 100 MHz PM Modulated signal with a 12 kHz tone and 5.0 Radians deviation. Signal is applied at the T/R Connector.

1. Set RF Field to ***100 MHz***.
2. Set Input Connector to ***T/R***.
3. Set Attenuation to ***0 dB***.
4. Set Demodulation Type to ***PM***.
5. Set IF Bandwidth to ***300 kHz***.
6. Access Filters Setup Menu.
7. Set Mod Meter Filter Line Low-Pass Filter to ***OFF***.
8. Configure RF Receive Operation Screen to display Phase Modulation Meter. Access Full Screen Phase Modulation Meter.
9. Set Range to ***10 RAD***.
10. Set Peak Hold, Average, Upper Limit, Lower Limit and Alarm as required.
11. Return to RF Receive Operation Screen.
12. Apply signal to T/R Connector.

4-3-10 MEASURING TRANSMITTER POWER

This procedure configures the RF Receive Operation Screen to measure the power of a 100 MHz RF Signal at the T/R Connector.

1. Set RF Field to ***100 MHz***.
2. Set Input to ***T/R***.
3. Set Attenuation to ***0 dB***.
4. Set IF Bandwidth to ***300 kHz***.
5. Access Full Screen RF Power Meter.
6. Enter selected Cable Loss.
7. Set Range to ***AUTO***.
8. Set Peak Hold, Average, Upper Limit, Lower Limit and Alarm as required.
9. Return to RF Receive Operation Screen.
10. Apply signal to T/R Connector.

4-3-11 MEASURING TRANSMITTER FREQUENCY ERROR

This procedure configures the RF Receive Operation Screen to measure the Frequency Error of a 100 MHz RF Signal at the T/R Connector.

1. Set RF Field to ***100 MHz***.
2. Set Input to ***T/R***.
3. Set Attenuation to ***0 dB***.
4. Set IF Bandwidth to ***300 kHz***.
5. Access Full Screen RF Frequency Error Meter.
6. Set Range to ***AUTO***.
7. Set Peak Hold, Average, Upper Limit, Lower Limit and Alarm as required.
8. Set Gate Time to ***1.0 S***.
9. Return to RF Receive Operation Screen.
10. Apply signal to T/R Connector.

4-3-12 MEASURING TRANSMITTER AUDIO FREQUENCY

This procedure configures the RF Receive Operation Screen to measure the Audio Frequency of a 100 MHz RF Signal at the T/R Connector.

1. Set RF Field to ***100 MHz***.
2. Set Input to ***T/R***.
3. Set Attenuation to ***0 dB***.
4. Set IF Bandwidth to ***300 kHz***.
5. Set AF COUNTER Filter Lines as required.
6. Access Full Screen Audio Frequency Counter.
7. Set Range to ***AUTO***.
8. Set Peak Hold, Average, Upper Limit, Lower Limit and Alarm as required.
9. Set Gate Time to ***10 S***.
10. Return to RF Receive Operation Screen.
11. Apply signal to T/R Connector.

4-3-13 MEASURING TRANSMITTER DISTORTION

This procedure configures the RF Receive Operation Screen to measure the Distortion of a 100 MHz RF Signal at the T/R Connector. The signal is FM Modulated and has a 1 kHz sine wave as audio.

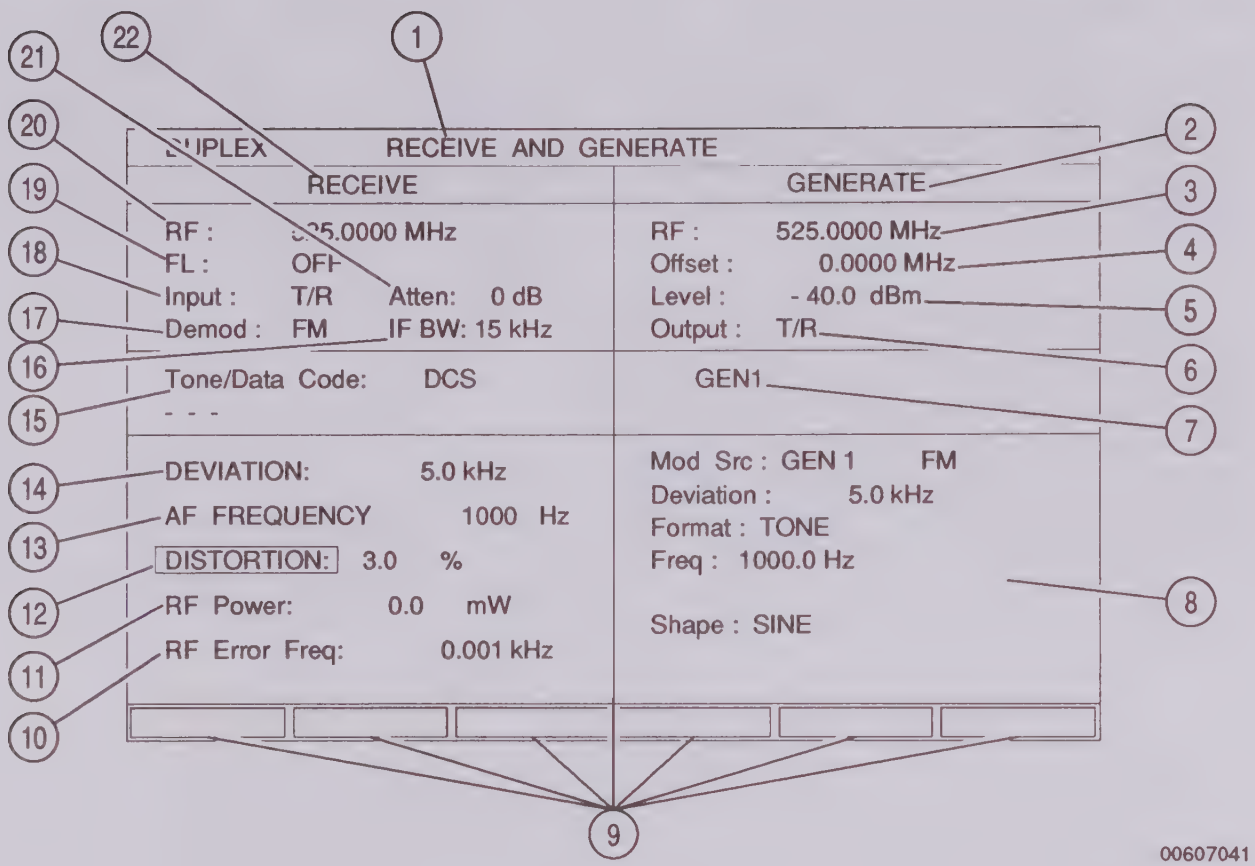
1. Set RF Field to ***100 MHz***.
2. Set Input to ***T/R***.
3. Set Attenuation to ***0 dB***.
4. Set Demodulation Type to ***FM***.
5. Set IF Bandwidth to ***300 kHz***.
6. Set DTMF/SINAD Low Pass Filter Line to 4 kHz.
7. Set DTMF/SINAD High Pass Filter Line to 300 Hz.
8. Access Full Screen Distortion Meter.
9. Set Peak Hold, Average, Upper Limit, Lower Limit and Alarm as required.
10. Return to RF Receive Operation Screen.
11. Apply signal to T/R Connector.

4-4 DUPLEX OPERATION

Pressing the DPLX MODE Key accesses the Duplex Operation Screen. The purpose of the Duplex Mode is for the COM-120B to act as a transmitter and receiver and test a transceiver that may or may not have a frequency offset.

Configuring the Duplex Operation Screen is covered in a very generic sense in this section. This section is provided to explain how each of the active fields are edited and what selections are available. It is not designed to perform a specific test, but instead is provided as a reference for operating the Duplex Operation Screen.

The Duplex Receive and Duplex Generate Operation Screens are similar in configuration and operation to the RF Receive and RF Generate Screens. Specific tests and configurations discussed in those two sections are applicable with the Duplex System.



Duplex Operation Screen

1. Enter desired frequency in Duplex Generate RF Field (3). Frequency range is .0000 to 1000 MHz. Activate additional functions as required as follows:

   - To operate with Δ Function active:

     - Press Δ On/Off Soft Function Key F2 until Δ prompt appears beside Duplex Generate RF Field(3).

     - Δ= increment is accessed by pressing Δ = Soft Function Key F1 activating window to set Duplex Generate RF Field (3) change increment. Range of increment is 0 to 500 MHz. Press RETURN Soft Function Key F6 to close Change Window.

     - To deactivate Δ Function, press Δ On/Off Soft Function Key F2 until Δ prompt no longer appears beside RF Field

   - To Operate with Set Reference Function, press SET REF Soft Function Key F3 until ***R*** appears beside Duplex Generate RF Field (3). When active, Duplex Generate RF Field (3) is set to 0 MHz and changes made to Duplex Generate RF Field (3) display offset from Reference Frequency. To deactivate Set

Reference Function, press SET REF Soft Function Key until ***R*** is not visible.

- To activate Pair Function, press PAIR Soft Function Key F5. To deactivate Pair Function, press UNPAIR Soft Function Key F5.

2. Set Frequency Offset (4) to desired value. Selections range from -999.750 to 999.750 MHz. To activate Pair Function, press PAIR Soft Function Key F1. To deactivate Pair Function, press UNPAIR Soft Function Key F2.

3. Set Output Level (5) as follows:

   - Select Output Level Units as follows:

     - Pressing dBm Soft Function Key F1 selects dBm as Output Level Units.

     - Pressing uV Soft Function Key F2 selects µV as Output Level Units.

     - Pressing mV Soft Function Key F3 selects mV as Output Level Units.

     - Pressing V Soft Function Key F4 selects V as Output Level Units.

     - Pressing uV Soft Function Key F2 selects µV as Output Level Units.

     - Once Output Level Units are selected, select Output Level.

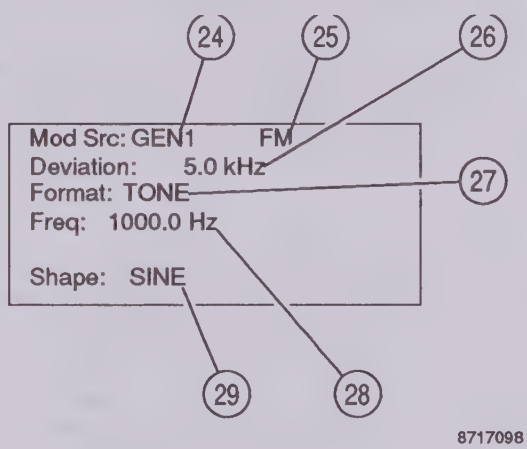
   - 4.Select Output (6) as follows:

   - Press T/R Soft Function Key F1 to select T/R Connector as output connector.

   - Press AUX Soft Function Key F2 to select AUX RF Connector as output connector.

   - Press T/R Gate Soft Function Key F3 to select T/R Connector as output connector. Output is only active when microphone is keyed while attached to MIC/ACC Connector.

   - Press AUX Gate Soft Function Key F4 to select AUX RF Connector as gated output connector. Output is only active when microphone is keyed while attached to MIC/ACC Connector.



5. Set Modulation Source Block (8) as follows:

   - If Audio Generator 1 (GEN1) Operation is desired, perform Step 6.

   - If Audio Generator 2 (GEN2) Operation is desired, perform Step 7.

   - If DATA Generator (DATA) Operation is desired, perform Step 8.

   - If DTMF Generator (DTMF) Operation is desired, perform Step 9.

- If External Modulation (EXT) Operation is desired, perform Step 10.

- If Microphone Modulation (MIC) Operation is desired, perform Step 11.

If two (or more) sections of the RF Modulator are set in conflict (e.g. GEN1 set for PM and GEN2 set for FM, or GEN1 set for 0.001 kHz deviation and GEN2 set for 2.60 kHz deviation) the screen displays the invalid source grayed out.

6. If Audio Generator 1 (GEN1) Operation is desired, set Modulation Source Block (4) as follows:

    - Press GEN1 Soft Function Key F1 to select GEN1 for Modulation Source (24).

    - Select Modulation Type (25) as follows:

    - Press OFF Soft Function Key F1 to deactivate GEN1.

    - Press AM Soft Function Key F2 if AM Modulation is desired.

    - Press FM Soft Function Key F3 if FM Modulation is desired.

    - Press PM Soft Function Key F4 if PM Modulation is desired.

    - Enter Deviation/Modulation Level (26). Range is 0.00 to 100 kHz for FM Modulation, 0.0% to 100.0% for AM Modulation, 0.00 to 10 Radians for PM Modulation.

    - Select Format (27). Formats available include USER and TONE.

    - With cursor on Format (27), select transmission type:

        - Press CONT Soft Function Key F2 to select continuous transmission of signal.

        - Press BURST Soft Function Key F3 if single transmission of selected signal.

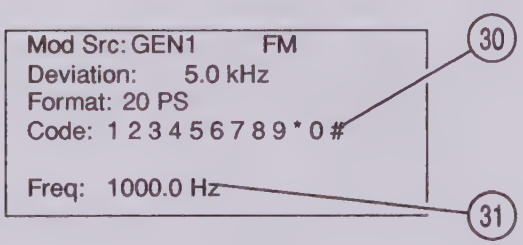
        - If TONE is selected as Format (27), press TIME Soft Function Key F4 to access Burst TIme WIndow. Enter Burst Time. Press RETURN Soft Function Key F6 to exit Window.

        - IF USER is selected as Format (27), Press CONFIG Soft Function Key F4 to access Configuration Window for configuring User Selectable Frequency and Duration for codes 0 through 9 and A through T. Enter desired frequencies and durations for codes. Range of frequencies are 0 to 9999.9 Hz. Range of durations are 0 to 99.999 seconds. Use PG UP Soft Function Key F1 to scroll up through Configuration Window. Use PG DN to scroll down through Configuration Window. Use FILL Soft Function Key F3 to fill remainder of current column with value of current cursor position. Press RETURN Soft Function Key F6 to exit Window.

    - If TONE is selected as Format (27):

        - Enter Audio Tone Frequency (28). Range is 0 to 20000 Hz for SINE Shape (29) and 0 to 10000 Hz for other Shape (29) settings.

- Select Shape (29) of Wave as follows:
- Press SINE Soft Function Key F1 to select SINE Wave Shape.
- Press RAMP Soft Function Key F2 to select RAMP Wave Shape.
- Press TRIANGLE Soft Function Key F3 to select TRIANGLE Wave Shape.
- Press SQUARE Soft Function Key F4 to select SQUARE Wave Shape.



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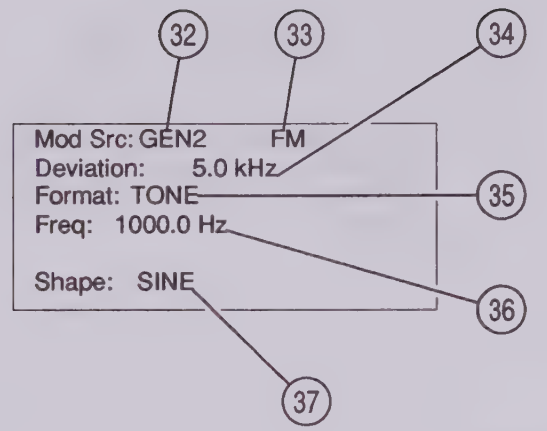
- If TONE is not selected Format (27):
  - Enter Code (30). Pressing CLEAR Soft Function Key F1 clears current entry.



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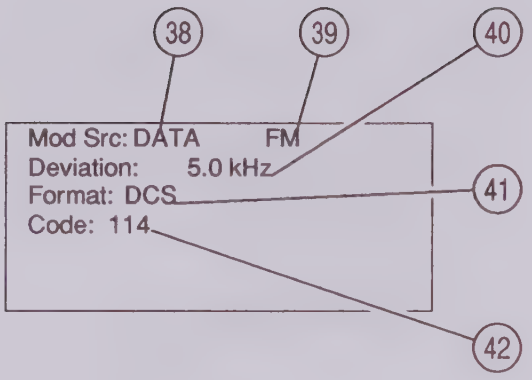
7. If Audio Generator 2 (GEN2) Operation is desired, set Modulation Source Block (9) as follows:
   - Press GEN2 Soft Function Key F2 to select GEN2 for Modulation Source (32).
   - Select Modulation Type (33) as follows:
   - Press OFF Soft Function Key F1 to deactivate GEN2.
   - Press AM Soft Function Key F2 if AM Modulation is desired.
   - Press FM Soft Function Key F3 if FM Modulation is desired.
   - Press PM Soft Function Key F4 if PM Modulation is desired.
   - Enter Deviation/Modulation Level (34). Range is 0.00 to 100 kHz for FM Modulation, 0.0% to 100.0% for AM Modulation and 0.00 to 10 Radians for PM Modulation.



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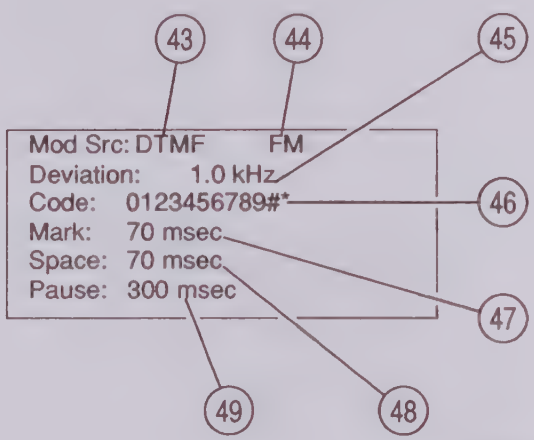
8. If DATA Generator (DATA) Operation is desired, set Modulation Source Block (9) as follows:

   - Press DATA Soft Function Key F3 to select DATA for Modulation Source (38).
   - Select Modulation Type (39) as follows:
     - Press OFF Soft Function Key F1 to deactivate DATA.
     - Press AM Soft Function Key F2 if AM Modulation is desired.
     - Press FM Soft Function Key F3 if FM Modulation is desired.
     - Press PM Soft Function Key F4 if PM Modulation is desired.
   - Enter Deviation/Modulation Level (40). Range is 0.00 to 100 kHz for FM Modulation, 0.0% to 100.0% for AM Modulation and 0.00 to 10 Radians for PM Modulation.
   - Select Format (41) as follows:
     - Cursor to the Format (41) field.
     - Press MENU Soft Function Key F1.
     - Cursor to the DCS Format.
     - Press RETURN Soft Function Key F6 to select DCS Format and return to normal operation.
   - Enter desired Code (42). Range is 000 (Octal) to 777 (Octal).



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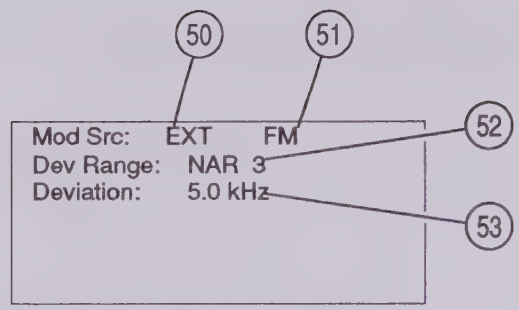
9. If DTMF Generator (DTMF) Operation is desired, set Modulation Source Block (9) as follows:

   - Press DTMF Soft Function Key F4 to select DTMF for Modulation Source (43).
   - Select Modulation Type (44) as follows:
     - Press OFF Soft Function Key F1 to deactivate DTMF.
     - Press AM Soft Function Key F2 if AM Modulation is desired.
     - Press FM Soft Function Key F3 if FM Modulation is desired.
     - Press PM Soft Function Key F4 if PM Modulation is desired.

- Enter Deviation/Modulation Level (45). Range is 0.00 to 100 kHz for FM Modulation, 0.0% to 100.0% for AM Modulation and 0.00 to 10 Radians for PM Modulation.
- Enter DTMF Code (46).
- Select desired Operation as follows:
  - Press CLEAR Soft Function Key F1 to clear code field of current data.
  - Press CONT Soft Function Key F2 to activate DTMF Code (46) in repeating loop.
  - Press BURST Soft Function Key F3 to activate DTMF Code (46) for one tone sequence.
  - Press KEY Soft Function Key F4 to set DATA ENTRY Keys as DTMF keypad.
- Enter selected Mark Time (47) for DTMF tones. Range is 10 to 999 ms.
- Enter selected Space Time (48) for DTMF tones. Range is 1 to 999 ms.
- Enter selected Pause Time (49) for DTMF tones. Range is 1 to 999 ms.



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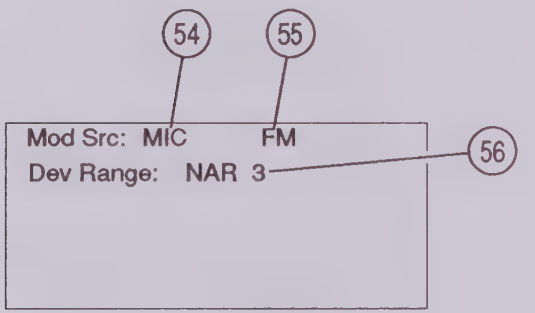
10. If External Modulation (EXT) Operation is desired, set Modulation Source Block (9) as follows:
    - Press EXT Soft Function Key F5 to select EXT for Modulation Source (50).
    - Select Modulation Type (51) as follows:
    - Press OFF Soft Function Key F1 to deactivate DTMF.
    - Press AM Soft Function Key F2 if AM Modulation is desired.
    - Press FM Soft Function Key F3 if FM Modulation is desired.
    - Press PM Soft Function Key F4 if PM Modulation is desired.
    - Press SET Soft Function Key F6 to setup the deviation meter when there is a conflict with the receiver deviation meter.
    - If FM Modulation is selected, select Deviation Range (52) as follows:

If other sources are Frequency Modulated and total Deviation ≥20 kHz, Deviation Range is automatically set to WIDE.

- Press NAR 3 Soft Function Key F1 for Dev Range (52) setting for deviation <2 kHz.
- Press NAR 2 Soft Function Key F2 for Dev Range (52) setting for deviation 2 to 12.75 kHz.
- Press NAR 1 Soft Function Key F3 for Dev Range (52) setting for deviation 12.75 to 25 kHz.
- Press WIDE Soft Function Key F4 for Dev Range (52) setting for deviation >25 kHz.



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11. If Microphone Modulation (MIC) Operation is desired, set Modulation Source Block (9) as follows:
    - Press MIC Soft Function Key F6 to select MIC for Modulation Source (54).
    - Select Modulation Type (55) as follows:
        - Press OFF Soft Function Key F1 to deactivate MIC.
        - Press AM Soft Function Key F2 if AM Modulation is desired.
        - Press FM Soft Function Key F3 if FM Modulation is desired.
        - Press PM Soft Function Key F4 if PM Modulation is desired.
    - If FM Modulation is selected, select Deviation Range (56) as follows:
        - Press NAR 3 Soft Function Key F1 for Dev Range (56) setting for deviation <2 kHz.
        - Press NAR 2 Soft Function Key F2 for Dev Range (56) setting for deviation 2 to 12.75 kHz.
        - Press NAR 1 Soft Function Key F3 for Dev Range (56) setting for deviation 12.75 to 25 kHz.
        - Press WIDE Soft Function Key F4 for Dev Range (56) setting for deviation >25 kHz.
12. Enter desired frequency in Duplex Receive RF Field (21). Frequency range is .0000 to 1000 MHz. Activate additional functions as required as follows:
    - To operate with Δ Function active:
        - Press Δ On/Off Soft Function Key F2 until Δ prompt appears.
        - Press Δ = Soft Function Key F1 to set Duplex Receive RF Field (21) change increment. Range is 0 to 500 MHz. Press RETURN Soft Function Key F6 to close window.

- To deactivate Δ Function, press Δ On/Off Soft Function Key F2 until Δ prompt no longer appears beside Duplex Receive RF Field (21).

- To activate Pair Function, press PAIR Soft Function Key F5. To deactivate Pair Function, press UNPAIR Soft Function Key F5.

13. If Frequency List Operation is desired instead of entering frequency in Duplex Receive RF Field (21), select Frequency List (20) Setting as follows:

    - Select Desired Frequency List (20) Type as follows:

        - Press T-Fwd Soft Function Key F2 to select Trunking Forward Channel List.

        - Press T-Rvs Soft Function Key F3 to select Trunking Reverse Channel List.

        - Press C-Fwd Soft Function Key F4 to select Cellular Forward Channel List.

        - Press C-Rvs Soft Function Key F5 to select Cellular Reverse Channel List.

        - Press FL Soft Function Key F6 to select User Defined Frequency List.

        - Press ON/OFF Soft Function Key F1 to active Frequency List (20) Setting.

    - If Cellular Channel List or User Defined Frequency List is selected, select channel/frequency number. Range of cellular channels is 1 to 1023. Range of Frequency List is 0 to 99.

    - If Trunking Channel List is selected, Select channel number. Select Reference Frequency by moving cursor to Reference Frequency Field and pressing ENTER. Select desired Reference Frequency using DATA SCROLL Keys or DATA SCROLL Spinner. Press ENTER Key.

14. Select Input (19) Connector as follows:

    - Press T/R Soft Function Key F1 to select T/R Connector.

    - Press ANT Soft Function Key F2 to select ANTENNA Connector.

15. Select Attenuation (22) as follows:

    - Press 30 dB Soft Function Key F1 to select 30 dB attenuation for Input Signal.

    - Press 0 dB Soft Function Key F2 to select no attenuation for Input Signal.

16. Select Demodulation Type (18) as follows:

    - Press FM Soft Function Key F1 to select FM demodulation.

    - Press AM Soft Function Key F2 to select AM demodulation.

    - Press PM Soft Function Key F3 to select PM demodulation.

17. Select IF Bandwidth (17) as follows:

    - Press 300 kHz Soft Function Key F1 to select 300 kHz IF Bandwidth Filter.

    - Press 15 kHz Soft Function Key F2 to select 15 kHz IF Bandwidth Filter.

For the following guidelines, ΔF is Frequency Deviation in Hz, Φ is Phase Deviation in Radians, F_m is the Tone Modulation Frequency in Hz and IF is Minimum IF Filter Bandwidth. General Guidelines for IF Filter Selection are as follows:

For FM Modulated Signals:
$IF = 4(\Delta F + F_m)$

For PM Modulated Signals:
$IF = 4F_m(\Phi + 1)$

For AM Modulated Signals:
$IF = 15$ kHz, for $F_m \leq 1$ kHz

18. Select Tone/Data Type for TONE/ DATA CODE Field as required. Press DECODE Soft Function Key F2 to activate decoding.

19. Select desired DISTORTION/SINAD Reading (13) as follows:

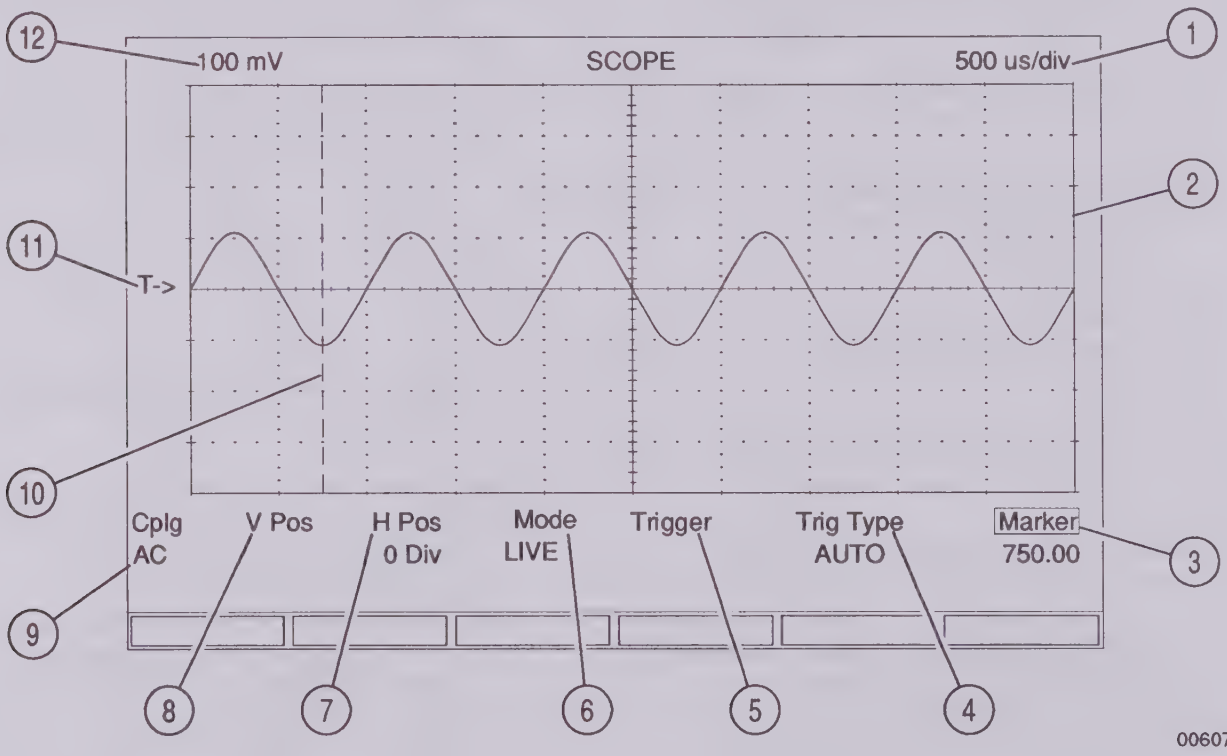
    - Press SINAD Soft Function Key F2 to select SINAD Reading.

    - Press DIST Soft Function Key F3 to select DISTORTION Reading.

4-5 OSCILLOSCOPE OPERATION SCREEN

Pressing the SCOPE INSTRUMENTS Key accesses the Oscilloscope Operation Screen. The purpose of the Independent Oscilloscope is to provide a test instrument that is independent of the other Operation Modes. What this section does is provide information for configuring the Oscilloscope in a generic sense. It is provided to explain how the active fields are edited and what selections are available. It is not designed to perform a specific test, but instead is provided as a reference for configuring the Independent Oscilloscope Operation Screen.

Configure and operate the Independent Oscilloscope Operation Screen as follows:



1. Select Sweep (1). Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

   - Press ROLL Soft Function Key F2 to view the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.
   - Press SLOW Soft Function Key F2 to return to the normal mode of operation.

2. Select Trigger Type (4) as follows:
   - Press NORM Soft Function Key F1 to select Normalized Trigger.
   - Press AUTO Soft Function Key F2 to select Auto Trigger.
   - Press 1 SHOT Soft Function Key F3 to select One Shot Trigger. Press 1 SHOT Soft Function Key F3 as needed to reset Trigger.
3. Set Trigger Level (11) as follows:
   - Move cursor to Trigger (5).

- Press ENTER Key.
- Use DATA SCROLL Spinner or DATA SCROLL Keys to set Trigger.
- Press ENTER Key to complete edit.

4. Select Operation Mode (6) as follows:
   - Press LIVE Soft Function Key F2 to select Live Operation Mode.
   - Press AVG Soft Function Key F3 to select Average Operation Mode.
   - Press COMPARE Soft Function Key F4 to select Compare Operation Mode.
   - Press RECALL Soft Function Key F5 to select Recall Operation Mode.
   - Press STORE Soft Function Key F6 to select Store Operation Mode.
5. Select H POS (7) Offset as needed. Range is -10 to 10 Divisions.
6. Set Vertical Position of trace as needed by accessing V POS (8) and editing with DATA SCROLL Keys or DATA SCROLL Spinner.
7. Select Coupling (9). Selections include GND (Ground), AC and DC. Select as follows:
   - Press GND Soft Function Key F1 to select GND as Coupling (9).
   - Press AC Soft Function Key F2 to select AC as Coupling (9).
   - Press DC Soft Function Key F3 to select DC as Coupling (9).
8. Select Oscilloscope Scale (12). Selections available are dependent on Scope Source (4). Selections include:

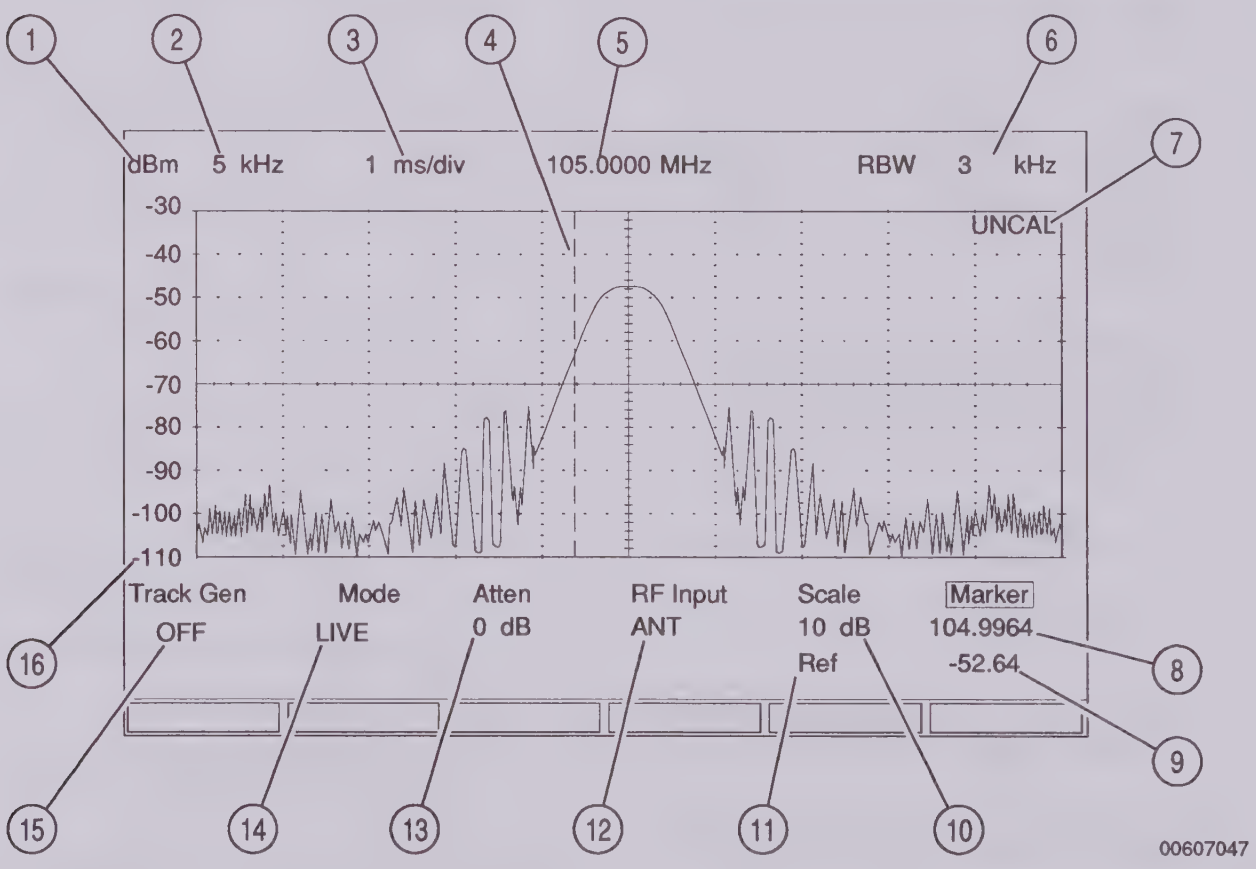
10 mV	20 mV	50 mV
100 mV	200 mV	500 mV
1 V	2 V	5 V
10 V	20 V	50 V

9. Activate Marker (10), as required, as follows:
   - With Cursor on Marker Position (3), press On/Off Soft Function Key F1.
   - Enter Desired Marker Position using DATA ENTRY Keys or DATA SCROLL Keys and/or DATA SCROLL Spinner.

4-6 SPECTRUM ANALYZER OPERATION SCREEN

Pressing the ANLYZ INSTRUMENTS Key accesses the Spectrum Analyzer Operation Screen. The purpose of the Independent Spectrum Analyzer is to provide a test instrument that is independent of the Operation Modes. What this section does is provide information in configuring the Spectrum Analyzer in a generic sense. It is provided to explain how the active fields are edited and what selections are available. It is not designed to perform a specific test, but instead is provided as a reference for configuring the Independent Spectrum Analyzer Operation Screen.

Configure and operate the Independent Spectrum Analyzer Operation Screen as follows:



1. Set Center Frequency (5). Press Set Ref Soft Function Key F1 if current Center Frequency is to be used as Reference Frequency. Press Split Soft Function Key F5 If Split Screen Operation is desired. If Find Function Operation is desired, configure as follows:

- Press Config Soft Function Key F4 to access Sweep Width Window. Enter Sweep Width. Press highlighted Config Soft Function Key F4 to close Window.

- Press Find Lvl Soft Function Key F3 to activate Marker for setting Find Level Reference. Use DATA SCROLL Spinner or DATA SCROLL Keys to edit Marker Level. Press Highlighted Find Lvl Soft Function Key F3 to complete operation.

- Press Find Soft Function Key F2 to activate Find Function.

2. Select Scan Width (2). Selections include zero scan and:

1 kHz	2 kHz	5 kHz
10 kHz	20 kHz	50 kHz
100 kHz	200 kHz	500 kHz
1 MHz	2 MHz	5 MHz
10 MHz	20 MHz	50 MHz
100 MHz		

The word "UNCAL" appears in the display when combinations of RBW, frequency span and sweep rate for which the analyzer is not calibrated are used.

3. Set Logarithmic Function (1) as follows:

- Press dBm Soft Function Key F1 to select dBm.

- Press dBµV Soft Function Key F2 to select dBµV.

- Press dBmV Soft Function Key F3 to select dBmV.

- Press dBV Soft Function Key F4 to select dBV.

- Press dBµW Soft Function Key F5 to select dBµW.

- Press dBW Soft Function Key F6 to select dBW.

4. Set Scale (10) as follows:

- Press 10 dB Soft Function Key F1 to select 10 dB for Vertical Scale (15).

- Press 2 dB Soft Function Key F2 to select 2 dB for Vertical Scale (13).

5. Select Mode (14) as follows:

- Press PKHOLD Soft Function Key F1 to select Peak Hold Operation Mode.

- Press LIVE Soft Function Key F2 to select Live Operation Mode.

- Press AVG Soft Function Key F3 to select Average Operation Mode.

- Press COMPARE Soft Function Key F4 to select Compare Operation Mode.

- Press RECALL Soft Function Key F5 to select Recall Operation Mode.

- Press STORE Soft Function Key F6 to select Store Operation Mode.

6. Activate Marker (4), as required, as follows:

- With Cursor on Marker Position (8), press On/Off Soft Function Key F1.

- Enter Desired Marker Position using DATA ENTRY Keys or DATA SCROLL Keys and/or DATA SCROLL Spinner.

7. Access Ref (11) Field to adjust Vertical Scale (14), as needed.

8. Select RF Input (12) as needed.

- Press T/R Soft Function Key F1 to select T/R Connector.

- Press ANT Soft Function Key F2 to select ANT Connector.

9. Select Attenuation (13) as needed.

   - Press 30 dB Soft Function Key F1 to select 30 dB Attenuation.

   - Press 0 dB Soft Function Key F2 to select 0 dB Attenuation.

10. Scan Sweep Selections Include:

200 µs/div	500 µs/div	1 ms/div
2 ms/div	5 ms/div	10 ms/div
20 ms/div	50 ms/div	100 ms/div
200 ms/div	500 ms/div	

4-7 AUDIO/DATA/SIGNALING GENERATORS

Pressing the AUDIO GEN INSTRUMENTS Key accesses the Independent Audio/Data/ Signaling Generators Operation Screen. The purpose of the Independent Audio/Data/ Signaling Generators is to provide baseband signal generators that are independent of the other Operation Modes. This section provides information on configuring the Audio/Data/Signaling Generators in the COM-120B. Configuring the Audio/Data/ Signaling Generators is covered in a generic sense. It is provided to explain how each of the active fields are edited and what selections are available. It is not designed to perform a specific test, but instead is provided as a reference.

The Audio/Data/Signaling Generators Operation Screen is composed of four sections, each of which represents a different generator. These generators are covered separately. Restrictions that apply to the generators are primarily related to the output level. The sum of the generators output level should not exceed 2.5 volts in X1 mode and 25 mV in /10 (divide by 10) mode. If /10 mode is selected, ALL signal generators are affected:

Audio Generator 1 Operation

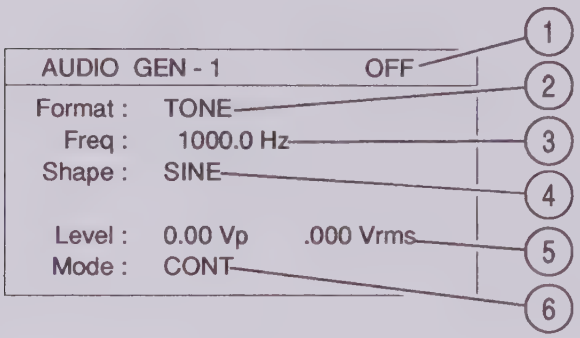
Audio Generator 2 Operation

DATA Generator Operation

DTMF Generator Operation

4-7-1 AUDIO GENERATOR 1 OPERATION

Configure and operate Audio Generator 1 as follows:



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1. With cursor at Audio Generator 1 Prompt (1), press GEN1 Soft Function Key F1 until Audio Generator 1 Prompt displays ***ON***.

2. Select Format (2). Formats available include TONE and USER:

3. If TONE is selected as Format (2):

   - Enter Audio Tone Frequency (3). Range is 5.0 to 20000 Hz.

   - Select Shape (4) of Wave as follows:

     - Press SINE Soft Function Key F1 to select SINE Wave Shape.

     - Press SQUARE Soft Function Key F2 to select SQUARE Wave Shape.

     - Press RAMP Soft Function Key F3 to select RAMP Wave Shape.

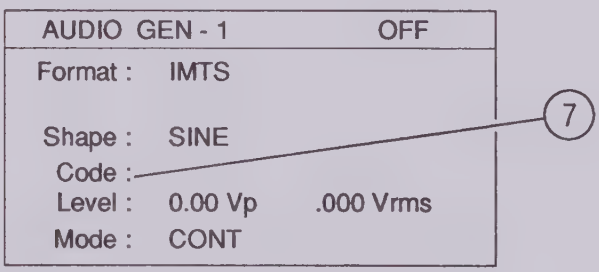
     - Press TRIANGLE Soft Function Key F4 to select TRIANGLE Wave Shape.

4. If USER is selected as Format (2):

   - Press CONFIG Soft Function Key F2 to access Configuration Window for configuring User Selectable Frequency and Duration for codes 0 through 9 and A through T. Configure as follows:

   - Enter desired frequencies and durations for codes. Range of frequencies are 0 to 9999.9 Hz. Range of durations are 20 to 9999 ms. Use PG UP Soft Function Key F1 to scroll up through Configuration Window. Use PG DN to scroll down through Configuration Window. Use FILL Soft Function Key F3 to fill remainder of current column with value of current cursor position.

   - Press RETURN Soft Function Key F6 to exit Window.



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   - Enter Code (7). Pressing CLEAR Soft Function Key F1 clears current code entry.

5. Enter Level (5). Selections range from 0 to 2.5 Vp in X1 (times 1) Mode and 0 to 25.0 mVp in /10 (divide by 10) Mode. Select Attenuation Mode as follows:

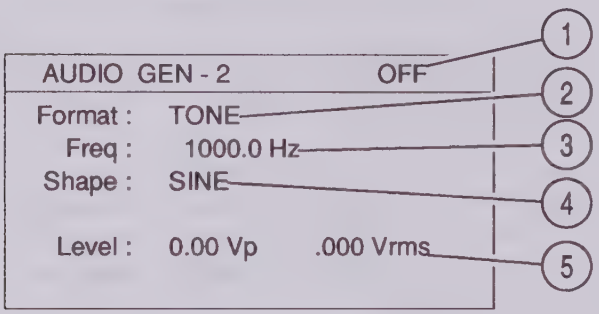
   - Press X1 Soft Function Key F1 to select X1 (times 1) Attenuation Mode.
   - Press /10 Soft Function Key F2 to select /10 (divide by 10) Attenuation Mode.

6. Select Mode (6) as follows:

   - Press CONT Soft Function Key F2 to select continuous transmission of signal.
   - Press BURST Soft Function Key F3 if single transmission of selected signal. If TONE is selected as Format (2), enter duration time for TONE Burst in T= field. Time duration ranges from 0 to 30 seconds.

4-7-2 AUDIO GENERATOR 2 OPERATION

Configure and operate Audio Generator 2 as follows:



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1. With cursor at Audio Generator 2 Prompt (1), press GEN2 Soft Function Key F2 until Audio Generator 2 Prompt displays ***ON***.

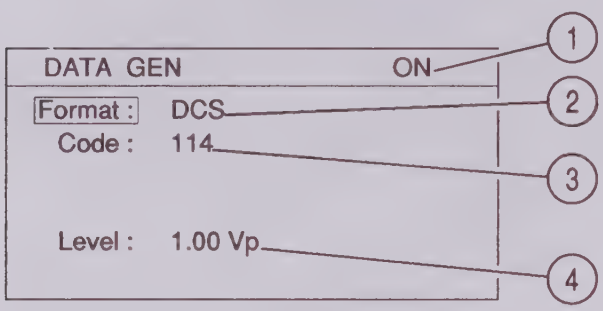
2. Enter Level (5). Selections range from 0 to 2.5 Vp in X1(times 1) Mode and 0 to 25.0 mVp in /10 (divide by 10) Mode. Select Attenuation Mode as follows:

   - Press X1 Soft Function Key F1 to select X1 (times 1) Attenuation Mode.

   - Press /10 Soft Function Key F2 to select /10 (divide by 10) Attenuation Mode.

4-7-3 DATA GENERATOR OPERATION

Configure and operate DATA Generator as follows:



8717066

1. With cursor at DATA Generator Prompt (1), press DATA Soft Function Key F3 until DATA Generator Prompt displays ***ON***.

2. Select Format (2) as follows:

   - Press DCS Soft Function Key F1 to select DCS Format.

   - Press DCS/ Soft Function Key F2 to select DCS Inverted Format.

3. Enter desired Code (3). Range is 000 (Octal) to 777 (Octal).

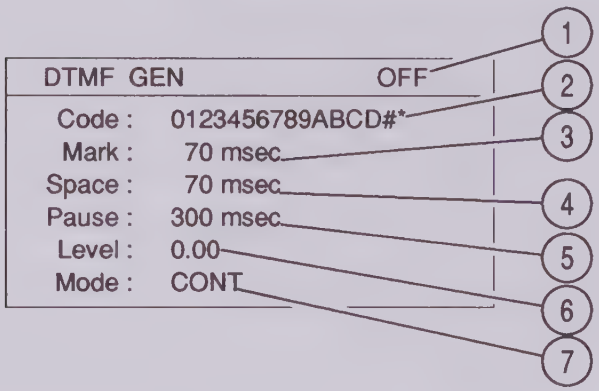
4. Enter Level (4). Selections range from 0 to 2.5 Vp in X1 (times 1) Mode and 0 to 25.0 mVp in /10 (divide by 10) Mode. Select Attenuation Mode as follows:

   - Press X1 Soft Function Key F1 to select X1 (times 1) Attenuation Mode.

   - Press /10 Soft Function Key F2 to select /10 (divide by 10) Attenuation Mode.

4-7-4 DTMF GENERATOR OPERATION

Configure and operate DTMF Generator as follows:



8717067

1. With cursor at DTMF Generator Prompt (1), press DTMF Soft Function Key F4 until DTMF Generator Prompt displays ***ON***.

2. Enter DTMF Code (2).

   - Press CLEAR Soft Function Key F1 to clear code field of current data.

3. Enter selected Mark Time (3) for DTMF tones. Range is 25 to 999 ms.

4. Enter selected Space Time (4) for DTMF tones. Range is 25 to 999 ms.

5. Enter selected Pause Time (5) for DTMF tones. Range is 25 to 999 ms.

6. Enter Level (6). Selections range from 0 to 2.5 Vp in X1 (times 1) Mode and 0 to 25.0 mVp in /10 (divide by 10) Mode. Select Attenuation Mode as follows:

   - Press X1 Soft Function Key F1 to select X1 (times 1) Attenuation Mode.

   - Press /10 Soft Function Key F2 to select /10 (divide by 10) Attenuation Mode.

7. Select desired Operation as follows:

   - Press CONT Soft Function Key F2 to activate DTMF Code (2) in repeating loop.

   - Press BURST Soft Function Key F3 to activate DTMF Code (2) for one tone sequence.

   - Press KEY Soft Function Key F4 to set DATA ENTRY Keys as DTMF keypad.

4-8 METERS OPERATION

Pressing the MTRS INSTRUMENTS Key accesses the Independent Meters Menu. The purpose of the Independent Meters is to provide test equipment that is independent of the Operation Modes. This section provides information on configuring the COM-120B Independent Meters. Configuring the Independent Meters is covered in a generic sense. It is provided to explain how each of the active fields are edited and what selections are available. It is not designed to perform a specific test, but instead is provided as a reference.

From the Meters Menu, the operator can access the Independent Meters by placing the cursor on the number of the desired meter and pressing the ENTER Key.

Audio Frequency Counter Operation

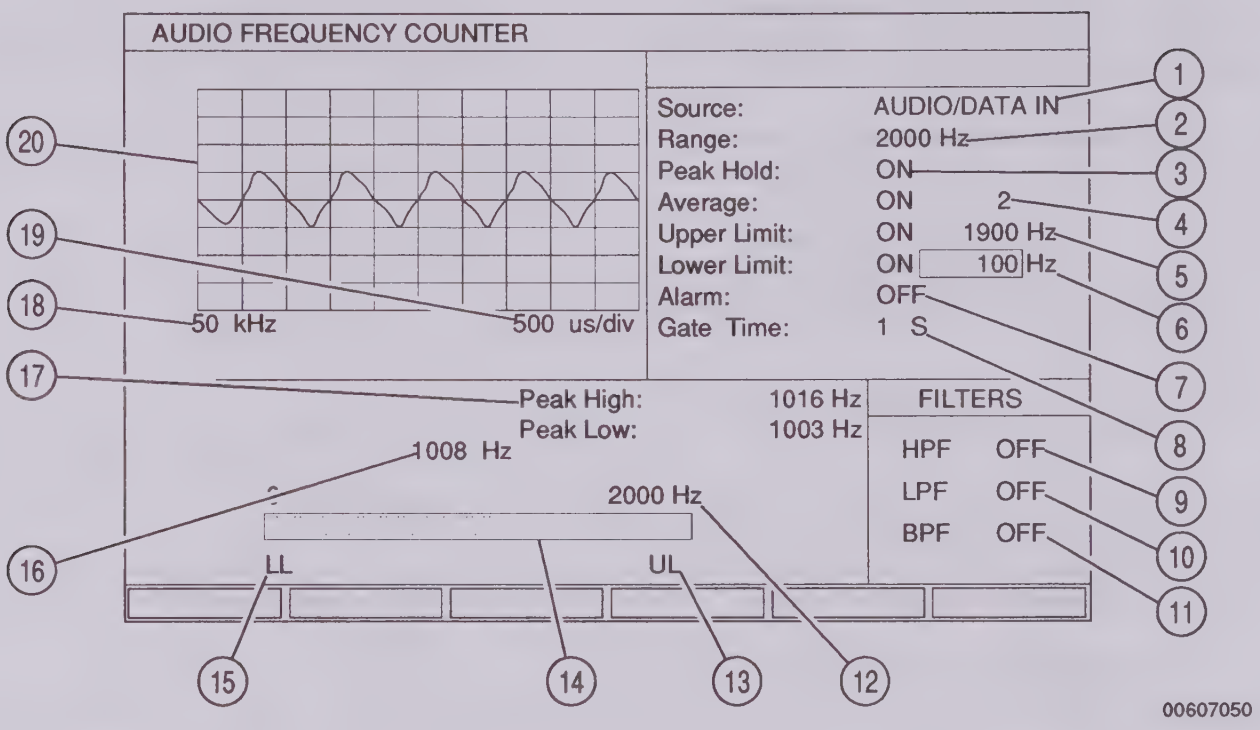
SINAD Meter Operation

Digital Voltmeter Operation

Distortion Meter Operation

4-8-1 AUDIO FREQUENCY COUNTER OPERATION

Configure and operate Audio Frequency Counter as follows:



1. Select Source (1) as follows:

   - Press AUD/DAT Soft Function Key F1 to select AUDIO/DATA IN Connector as Source (1).
   - Press RF POW Soft Function Key F2 to select RF Power Meter input line as Source (1).
   - Press EXT MOD Soft Function Key F3 to select EXT MOD Connector as Source (1).
   - Press SC/DVM Soft Function Key F4 to select SCOPE/DVM Connector as Source (1).

2. Set Range (2). Selections include Autorange, 200 Hz, 2 kHz and 20 kHz.

3. If Peak Hold Function is desired, do not select Autorange. Configure as follows:

   - With cursor on Peak Hold (3), press OFF/ON Soft Function Key F1 until Peak Hold (3) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (3) displays ***OFF***.

4. If Average Function is desired, configure as follows:

   - With cursor on Average (4), press OFF/ON Soft Function Key F1 until Average (7) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (4) displays ***OFF***.

5. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (5), press OFF/ON Soft Function Key F1 until Upper Limit (5) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 20000 Hz.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (5) displays ***OFF***.

6. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (6), press OFF/ON Soft Function Key F1 until Lower Limit (6) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 20000 Hz.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (6) displays ***OFF***.

7. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (7), press OFF/ON Soft Function Key F1 until Alarm (10) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (7) displays ***OFF***.

8. Set Gate Time (8). Selections include 1 and 10 seconds.

9. Set High-Pass Filter (9) as follows:

   - Press OFF Soft Function Key F1 to set High-Pass Filter (9) to ***OFF***.
   - Press 300 Hz Soft Function Key F2 to set High-Pass Filter (9) to ***300 Hz***.
   - Press 4 kHz Soft Function Key F3 to set High-Pass Filter (9) to ***4 kHz***.

10. Set Low-Pass Filter (10) as follows:

    - Press OFF Soft Function Key F1 to set Low-Pass Filter (10) to ***OFF***.
    - Press 300 Hz Soft Function Key F2 to set Low-Pass Filter (10) to ***300 Hz***.
    - Press 4 kHz Soft Function Key F3 to set Low-Pass Filter (10) to ***4 kHz***.
    - Press 20 kHz Soft Function Key F4 to set Low-Pass Filter (10) to ***20 kHz***.

11. Set Bandpass Filter (11) as follows:

    - Press OFF Soft Function Key F1 to set Bandpass Filter (11) to ***OFF***.

- Press C-MSG Soft Function Key F2 to set Bandpass Filter (11) to C-Message Weighted Filter (*C-MSG*).

12. Set Scope Scale (18). Selections change depending on selected Source (1). Selections include:

Source (1)	Scale
RF POW	LOW(2 mW to 20 mW signal) MED (>20 mW to 2 W signal) HIGH (>2 W to 200 W signal
AUD/DAT or EXT MOD	100, 200, 500 mV 1, 2, 5 V
SC/DVM	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V

13. Set Scope Sweep (19). Selections include:

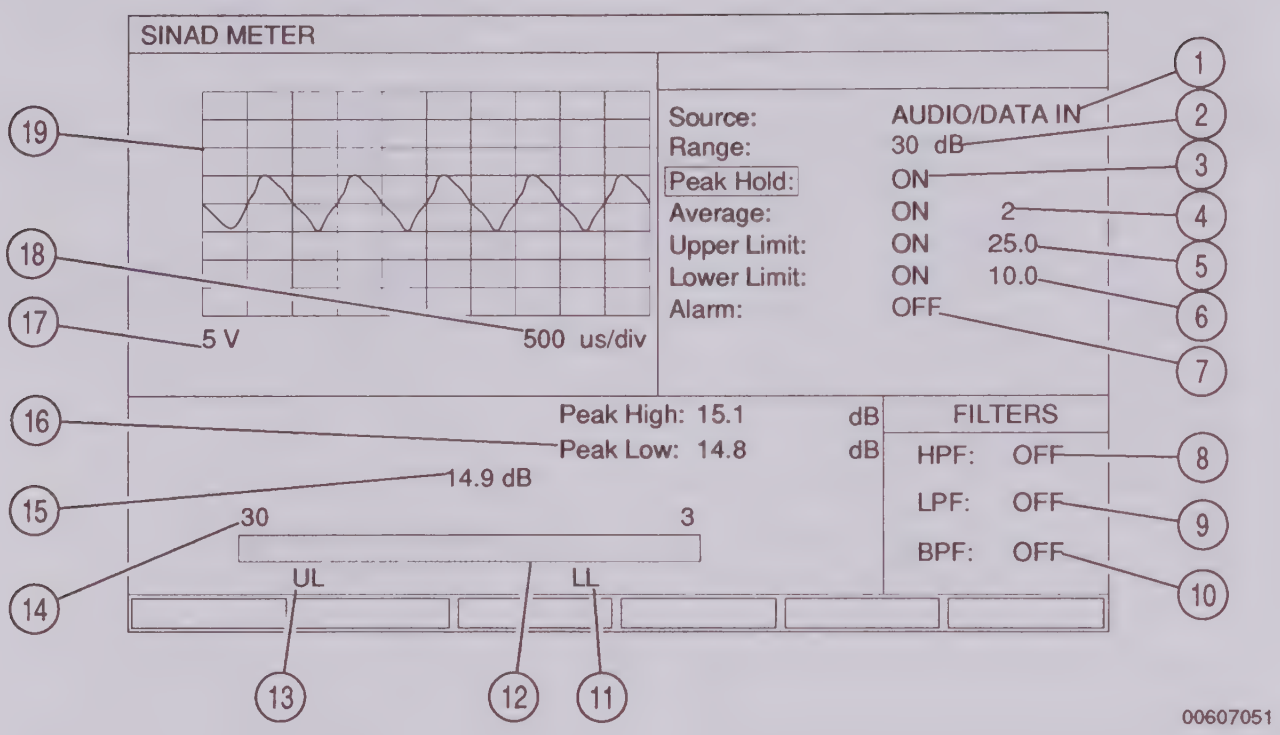
100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

- Press ROLL Soft Function Key F2 to view the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.

- Press SLOW Soft Function Key F2 to return to the normal mode of operation.

4-8-2 SINAD METER OPERATION

Configure and operate SINAD Meter as follows:



1. Select Source (1) as follows:

   - Press AUD/DAT Soft Function Key F1 to select AUDIO/DATA IN Connector as Source (1).
   - Press SC/DVM Soft Function Key F2 to select SCOPE/DVM Connector as Source (1).

2. Select Range (2) as follows:

   - Press 15 dB Soft Function Key F1 to select 15 dB as Range (2).
   - Press 30 dB Soft Function Key F2 to select 30 dB as Range (2).
   - Press AUTO Soft Function Key F3 to select Autorange for Range (2).

3. If Peak Hold Function is desired, do not select Autorange. Configure as follows:

   - With cursor on Peak Hold (3), press OFF/ON Soft Function Key F1 until Peak Hold (3) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (3) displays ***OFF***.

4. If Average Function is desired, configure as follows:

   - With cursor on Average (4), press OFF/ON Soft Function Key F1 until Average (4) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (4) displays ***OFF***.

5. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (5), press OFF/ON Soft Function Key F1 until Upper Limit (5) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 30.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (5) displays ***OFF***.

6. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (6), press OFF/ON Soft Function Key F1 until Lower Limit (6) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 30.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (6) displays ***OFF***.

7. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (7), press OFF/ON Soft Function Key F1 until Alarm (7) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (7) displays ***OFF***.

8. Set High-Pass Filter (8) as follows:

   - Press OFF Soft Function Key F1 to set High-Pass Filter (8) to ***OFF***.
   - Press 300 Hz Soft Function Key F2 to set High-Pass Filter (8) to ***300 Hz***.
   - Press 4 kHz Soft Function Key F3 to set High-Pass Filter (8) to ***4 kHz***.

9. Set Low-Pass Filter (9) as follows:

   - Press OFF Soft Function Key F1 to set Low-Pass Filter (9) to ***OFF***.
   - Press 300 Hz Soft Function Key F2 to set Low-Pass Filter (9) to ***300 Hz***.
   - Press 4 kHz Soft Function Key F3 to set Low-Pass Filter (9) to ***4 kHz***.
   - Press 20 kHz Soft Function Key F4 to set Low-Pass Filter (9) to ***20 kHz***.

10. Set Bandpass Filter (10) as follows:

    - Press OFF Soft Function Key F1 to set Bandpass Filter (10) to ***OFF***.
    - Press C-MSG Soft Function Key F2 to set Bandpass Filter (10) to C-Message Weighted Filter (***C-MSG***).

11. Set Scope Scale (12). Selections change depending on selected Source (1). Selections include:

Source (1)	Scale
AUD/DAT	100, 200, 500 mV 1, 2, 5 V
SC/DVM	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div

12. Set Scope Sweep (18). Selections include:

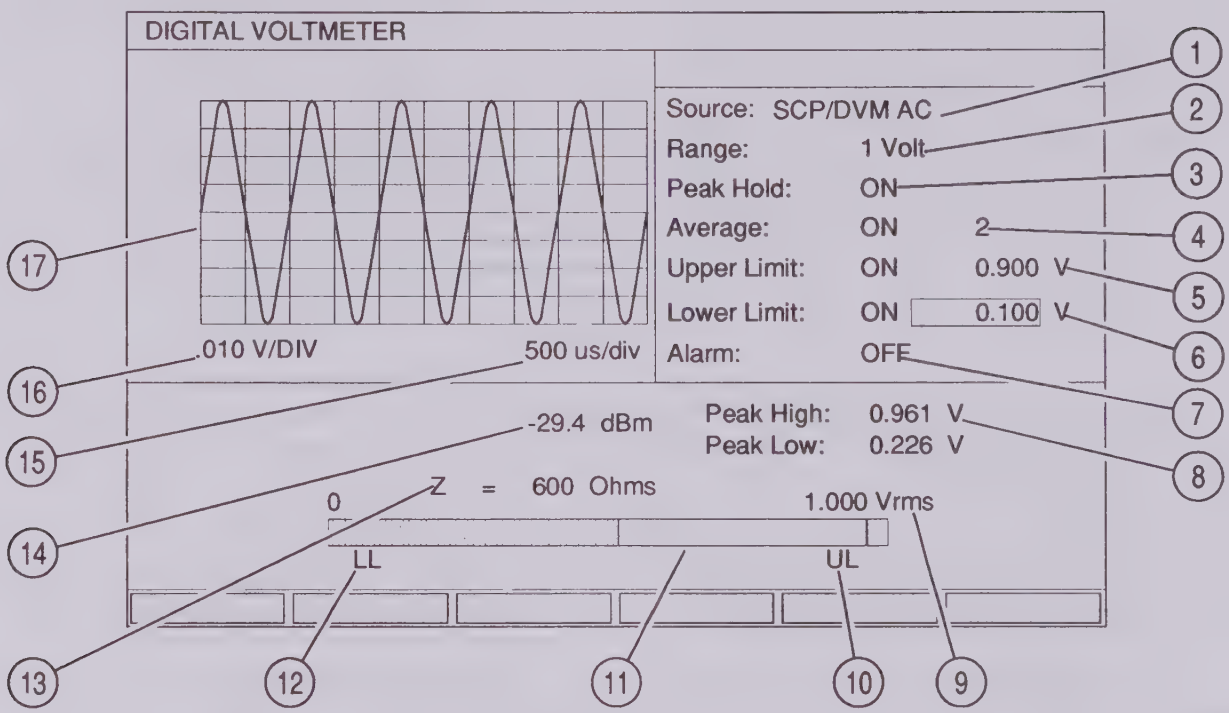
100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

- Press ROLL Soft Function Key F2 to view the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.

- Press SLOW Soft Function Key F2 to return to the normal mode of operation.

4-8-3 DIGITAL VOLTMETER OPERATION

Configure and operate Digital Voltmeter as follows:



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1. Select Source (1). Selections include:

SC/DVM DC
SC/DVM AC
SC/DVM GND)
AUDIO/DATA IN
EXT MOD IN

2. Select Range (2). Selection include:

50 mV	100 mV	200 mV
500 mV	1 V	2 V
5 V	10 V	20V
50 V	100 V	200 V

3. If Peak Hold Function is desired, configure as follows:

- With cursor on Peak Hold (3), press OFF/ON Soft Function Key F1 until Peak Hold (3) displays ***ON***.
- Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
- Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (3) displays ***OFF***.

4. If Average Function is desired, configure as follows:

- With cursor on Average (4), press OFF/ON Soft Function Key F1 until Average (4) displays ***ON*** and Sample Number appears.
- Enter Sample Number. Range is 2 to 10.

- Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (4) displays ***OFF***.

5. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (5), press OFF/ON Soft Function Key F1 until Upper Limit (5) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 200 V.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (5) displays ***OFF***.

6. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (6), press OFF/ON Soft Function Key F1 until Lower Limit (6) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 200 V.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (6) displays ***OFF***.

7. If Alarm Function is desired, configure as follows:

   - Press OFF/ON Soft Function Key F1 until Alarm (7) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (7) displays ***OFF***.

8. If Source (1) is SC/DVM AC, AUDIO/DATA IN or EXT MOD IN, set Reading (14) Units as follows:

   - Press Vrms Soft Function Key F1 to set Reading (13) Units to ***Vrms***.
   - Press dBm Soft Function Key F1 to set Reading (13) Units to ***dBm***. Set Impedance (13) for desired load. Place required load on connector specified by Source (1).
   - Press dB Soft Function Key F1 to set Reading (13) Units to ***dB***.

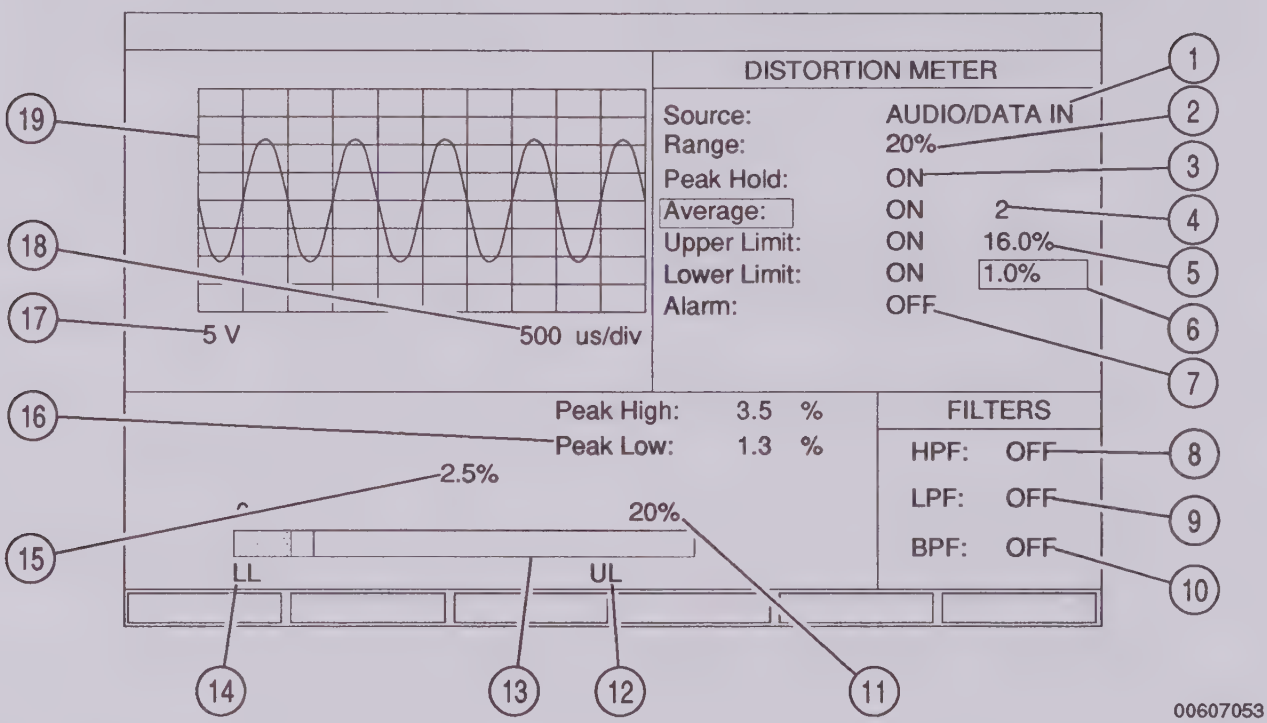
9. Set Scope Sweep (15). Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

   - Press ROLL Soft Function Key F2 to view the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.
   - Press SLOW Soft Function Key F2 to return to the normal mode of operation.

4-8-4 DISTORTION METER OPERATION

Configure and operate Distortion Meter as follows:



1. Select Source (1) as follows:

   - Press AUD/DAT Soft Function Key F1 to select AUDIO/DATA IN Connector as Source (1).
   - Press SC/DVM Soft Function Key F2 to select SCOPE/DVM Connector as Source (1).

2. If Peak Hold Function is desired, configure as follows:

   - With cursor on Peak Hold (3), press OFF/ON Soft Function Key F1 until Peak Hold (3) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (3) displays ***OFF***.

3. If Average Function is desired, configure as follows:

   - With cursor on Average (4), press OFF/ON Soft Function Key F1 until Average (4) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (4) displays ***OFF***.

4. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (5), press OFF/ON Soft Function Key F1 until Upper Limit (5) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0% to 20%.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (5) displays ***OFF***.

5. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (6), press OFF/ON Soft Function Key F1 until Lower Limit (6) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0% to 20%.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (6) displays ***OFF***.

6. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (7), press OFF/ON Soft Function Key F1 until Alarm (7) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (7) displays ***OFF***.

7 Set High-Pass Filter (8) as follows:

   - Press OFF Soft Function Key F1 to set High-Pass Filter (8) to ***OFF***.
   - Press 300 Hz Soft Function Key F2 to set High-Pass Filter (8) to ***300 Hz***.
   - Press 4 kHz Soft Function Key F3 to set High-Pass Filter (8) to ***4 kHz***.

8. Set Low-Pass Filter (9) as follows:

   - Press OFF Soft Function Key F1 to set Low-Pass Filter (9) to ***OFF***.
   - Press 300 Hz Soft Function Key F2 to set Low-Pass Filter (9) to ***300 Hz***.
   - Press 4 kHz Soft Function Key F3 to set Low-Pass Filter (9) to ***4 kHz***.
   - Press 20 kHz Soft Function Key F4 to set Low-Pass Filter (9) to 20 kHz.

9. Set Bandpass Filter (10) as follows:

   - Press OFF Soft Function Key F1 to set Bandpass Filter (10) to ***OFF***.
   - Press C-MSG Soft Function Key F2 to set Bandpass Filter (10) to C-Message Weighted Filter (***C-MSG***).

10. Set Scope Scale (17). Selections change depending on selected Source (1). Selections include:

Source (1)	Scale
AUD/DAT	100, 200, 500 mV 1, 2, 5 V
SC/DVM	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div

11. Set Scope Sweep (18). Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

- Press ROLL Soft Function Key F2 to view the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.
- Press SLOW Soft Function Key F2 to return to the normal mode of operation.

SECTION 5 - REMOTE OPERATION

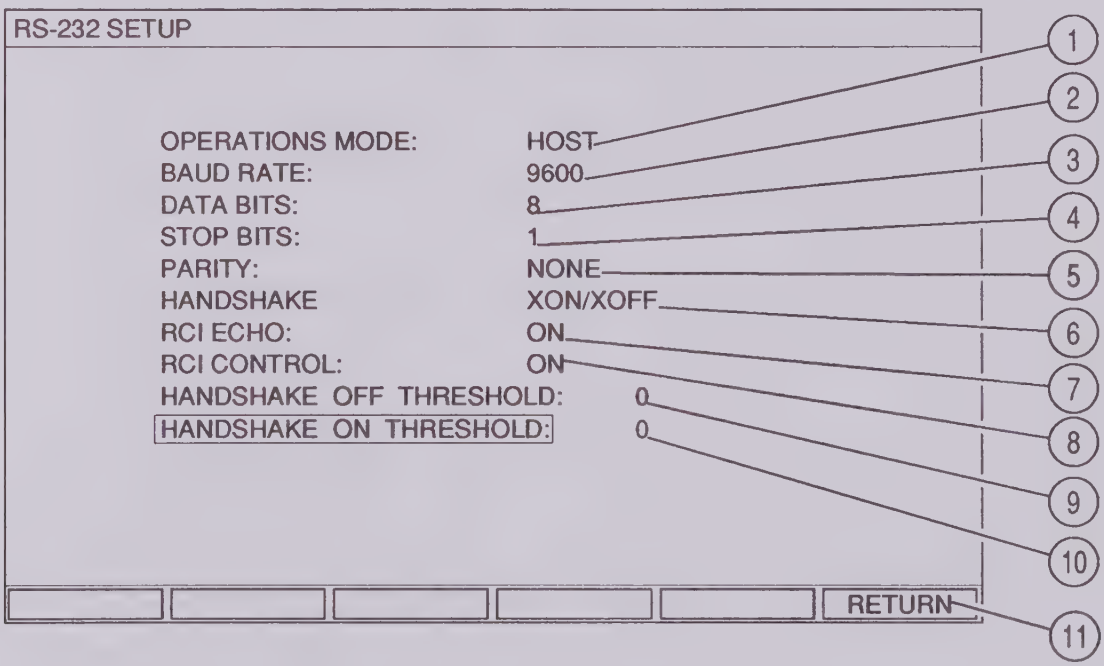
5-1 GENERAL

The COM-120B is designed to operate remotely through an external controller. All data available through Front Panel Operation is available through the External Controller. The External Controller can generate any command available except to turn power on.

Remote Operation can be performed using the RS-232 Connector or the GPIB Connector (with Option 13 installed). Refer to Appendix A for pin-out information.

It is important that the operator be familiar with this manual and the Front Panel Operation of the COM-120B before initiating Remote Operations.

5-2 CONFIGURING THE COM-120B FOR REMOTE OPERATION USING RS-232 CONNECTOR



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1. Connect external control device to COM-120B.
2. Press SETUP MEMORY Key to access Setup Screen.
3. Use DATA SCROLL Keys to move cursor to *5. RS-232 SETTINGS*. Press ENTER Key.
4. Set Operations Mode (1) to ***HOST***.
5. Set BAUD RATE (2) to match external control device.
6. Set DATA BITS (3) to match external control device.
7. Set STOP BITS (4) to match external control device.
8. Set Parity Bits (5) to match external control device.

5-4 COM-120B SPECIFIC COMMANDS

The following list of commands is broken up by function. All string values must be entered within Quotation marks (" "). Within the list, the commands are listed in hierarchal order. Each hierarchy is separated by a colon(:). For example, the command "RECeiver:INPut:ATTenuation 30" is listed as follows:

```
R ECeiver
   :INPut
      :ATTenuation v                                  Set input ATTenuation.
```

The v is a variable parameter. At least one space is required between commands and parameters. When more than one parameter is required, they are separated by a comma (,). The example given is a command to set the COM-120B. Another type of command used is a Query Command. Query Commands contain a question mark (?) at the end of the command and before any parameters.

Commands are listed in upper and lower case letters. This is to identify the short and long form of the command. The upper case letters identify the short form of the command. The upper and lower case letters, together, identify the long form of the command.

ANALYZER COMMANDS

NOTE1: Assumed units are MHz. Valid units are Hz, kHz, MHz or GHz. Accepted frequency range is from 250 kHz through 1 GHz in 0.1 kHz steps.

ANALyzer		
:ADJust		Adjusts vertical scale using internal -40 dB reference signal.
:BANDwidth v[units]		Sets the Resolution Bandwidth of the analyzer. v may be: 300 Hz, 3 kHz, 30 kHz, 300 kHz or 3 MHz. [units] may be Hz, kHz, or MHz. The default is Hz.
:DEFault		Sets the Resolution Bandwidth to the default value for the current analyzer SPAN-width.
:RESolution v[units]		Identical to SWEEP. Included for SCPI standard.
:Bandwidth?		Returns the current analyzer Resolution Bandwidth.
:FIND		
:INITiate		Starts Find function.
:LEVel v	0 to 255	Sets Find level in pixels. Top of Screen is 255.
:LEVel?		Queries Find level.
:SWEep		
:WIDth v	.2000 to 500.0000	Sets Find sweep width in MHz with .0001 MHz increments.
:WIDth?		Returns sweep width in MHz.
:FREQuency v[units]	.0000 to 1000.0000	Sets Center Frequency . See Note 1.
:FREQuency?		Queries Center Frequency.
:INPut		
:ANTenna		Sets ANTENNA Connector as input.
:ATTenuation v	0 or 30	Sets input ATTenuation in dB.
:ATTenuation?		Queries input ATTenuation.
:TR		Sets T/R Connector as input.
:INPut?		Queries selected input connector.
:MARKer		
:AMPLitude?		Queries level at active marker location.
:FREQuency v[units]		Sets marker frequency. Range of value is

ANALyzer		
:MARKer		
:FREQuency v[units]		Sets marker frequency. Range of value is dependent on scan width. Marker frequency must be in displayed frequency window. See Note 1.
:FREQuency?		Queries Marker Frequency.
:STATe b	0 or 1	Sets Marker to ON or OFF.
:STATe?		Queries Marker state.
:MODE	AVERage	Sets Mode to Average.
	COMPare	Sets Mode to Compare.
	LIVE	Sets Mode to LIVE.
	PEAKhold	Sets Mode to Peakhold.
	RECAll	Recalls stored trace.
	STORe	Stores current trace in memory.
:MODE?		Queries Mode Type.
:REFerence		
:LEVel v		Sets Reference Level. Range is dependent on Scale. Range is 0 to 2 in 10 dB mode. Range is 0 to 64 in 2 dB mode.
:LEVel?		Queries Reference Level.
:SCALe v	2 or 10	Sets Scale in dB.
:UNITs	DBM	Sets Scale Units to dBm.
	DBW	Sets Scale Units to dBW.
	DBMV	Sets Scale Units to dBmV.
	DBUV	Sets Scale Units to dBµV.
	DBUW	Sets Scale Units to dBµW.
	DBV	Sets Scale Units to dBV.
:UNITs?		Queries Units selected.
:SCALe?		Returns Scale value.
:SPAN v[units]	1, 2, 5, 10, 20, 50,	Sets Spanwidth. Assumed units are kHz.
:SPAN	100, 200, 500 kHz, 1, 2, 5, 10, 20, 50, 100 MHz	Accepted units are KHZ and MHZ.
:DEFault		Sets the Sweep Rate and Resolution Bandwidth to the default values for the current SPAN-width.
:SPAN?		Returns Spanwidth value and units.
:SPLIT		Sets the analyzer to Split-mode of operation. Only applies to independent analyzer. Does not update screen.
:NORMAL		Sets the analyzer to Normal-mode of operation. Only applies to independent analyzer. Does not update screen.
:SWEEP v[units]		Sets the analyzer sweep rate per division. v may be: 200 µs, 500 µs, 1 ms, 2 ms, 5 ms, 10 ms, 20 ms, 50 ms, 100 ms, 200 ms, or 500 ms. [units] may be: microseconds or milliseconds. Microseconds is the default.
:TIME v[units]		Identical to SWEEP. Included for SCPI standard.
:DEFault		Sets the Sweep Rate to the default value for the current analyzer SPAN-width.
:SWEEP?		Returns the current analyzer sweep rate.
:TRACe		
:DATA?[v1,v2,v3]		Queries current data trace values. v1 specifies Mode (0[live], 1[recall], 2[peakhold]). v2 specifies start point in pixels, with range of 0 to 499. v3 specifies number of returned points in pixels with range of 0 to 499, where v1 + v2 ®500. Defaults are 0,0,500.

ANALyzer		
:TRACKgen b	0 or 1	Sets Tracking Generator to ON or OFF. Requires Option 12.
:LEVel v	-130 to +13 dBm	Sets Tracking Generator level in dBm.
:LEVel?		Queries Tracking Generator level.
:TRACKgen?		Queries Tracking Generator state.

BER COMMANDS

Refer to Measure Commands for initiating BER Meter operation and obtaining data. Send SYST:KEY:STOP command to halt BER Meter operation.

BER		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm status.
:BAUD v	75, 150, 300, 600, 1200, 2400, 4800, 9600	Sets baud rate of data transfer.
:BAUD?		Queries baud rate for data transfer.
:COUPling	AC or DC	Sets coupling for input signal.
:COUPling?		Queries Coupling status.
:FM		
:RANGe v[units]	10, 20, 50, 100	Sets Deviation Range in kHz.
:RANGe?		Queries Deviation Range.
:INPut	AUDIN	Sets Input to Audio Data In.
	DEMODulation	Sets input to demodulated signal.
:INPut?		Queries input setting.
:MODE		
:CONTinuous		Sets BER Meter to loop continuously.
:LOOP v	1 to 100000	Sets BER Meter to loop for specified number of tests.
:LOOP?		Queries number of loops for LOOP Mode.
:MODE?		Queries Mode type.
:OUTPut	AUDOUT	Sets output to AUDIO/DATA GEN Connector.
	GENerator	Sets output to RF Generator.
:OUTPut?		Queries output destination.
:PATTern	FIXed	Sets Data Pattern to Fixed.
	RANDom	Sets Data Pattern to Random.
:PATTern?		Queries Data Pattern type.
:PEAKhold		
:MAXimum?		Queries Maximum Peak Hold value.
:RESet		Resets Peak Hold function.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF
:STATe?		Queries Peak Hold setting.
:POLarity	INVerted	Sets Data Polarity to Inverted.
	NORmal	Sets Data Polarity to Normal.
:POLarity?		Queries DAta Polarity.
:SIZE v	128 to 100000	Sets size of data word in bits.
:SIZE?		Queries data word size.
:UPPer v1,v2		Sets Upper Limit to value defined as v1 EXP - v2. Range of v1 is 0 to 999. Range of v2 is 3 to 6.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
BER		
:UPPer?		Queries Upper Limit values.

DECODER COMMANDS

DECode		
:FORMat	EEA	Set DECode format for desired decode format.
	EIA	
	ZVEI	
	DZVei	
	DDZVei	
	CCIR	
	CCIRH	
	CCIRH4	
	NATel	
	EURo	
	TONE5_6	
	USER	
	DTMF	
	DCS	
	DCSINVerted	
	POCSag	
	POCInv	
:POCSag		
:BAUD v	512, 1200, 2400	Sets POCSAG receive baud rate.
:BAUD?		Queries POCSAG receive baud rate.
:MESSage?		Queries ASCII decode string. DCS and DCSINV are returned in SCPI #Q Octal format.

DISPLAY COMMANDS

The DISPlay subsystem changes the screen. Fields on the current display are updated as they are changed. New screens are displayed with this command.

DISPlay?		Queries current screen number.
DISPlay		
:ANALyzer		Displays independent Spectrum Analyzer.
:BER		Displays BER Meter.
:DUPLex		
:GENerator		No parameter for GEN screen.
	DISTortion	Displays dependent Distortion Meter.
	AFLevel	Displays AF Level Meter.
	SINad	Displays dependent SINAD Meter.
	SCOPe	Displays dependent Oscilloscope.
	ANALyzer	Displays dependent Analyzer.
:RECeiver		Displays Duplex Receive Operation Screen when no parameter is used.
	LEVel	Displays dependent Received Level Meter.
	MODulation	Displays Modulation Meter if demod is set to AM, Deviation Meter if demod is set to FM and the Phase Meter if demod is set to PM.
	DISTortion	Displays dependent Distortion Meter.
	AFCounter	Displays dependent AF Counter.
	POWer	Displays RF Power Meter.
	SINad	Displays dependent SINAD Meter.
	SCOPe	Displays dependent Oscilloscope.
DISPlay		
:DUPLEX		
	ANALyzer	Displays dependent Spectrum Analyzer.
	RFERror	Displays RF Error Meter.
:RECGen		Displays Duplex Screen.

DISPlay		
:FGENerator		Displays Audio/Data/Signal Generators
:GENerator		Displays RF Generate Operation Screen when no parameter is used.
	DISTortion	Displays dependent Distortion Meter.
	AFLevel	Displays AF Level Meter.
	SINad	Displays dependent SINAD Meter.
	SCOPe	Displays dependent Oscilloscope.
	ANALyzer	Displays dependent Analyzer.
:METers	DISTortion	Displays Independant Distortion Meter.
	SINad	Displays Independant SINAD Meter.
	AFCounter	Displays Independant AF Counter.
	DVM	Displays Independant DVM.
:RECeiver		Displays RF Receive Operation Screen when no parameter is used.
	LEVel	Displays dependent Received Level Meter.
	MODulation	Displays Modulation Meter same as Duplex Receiver.
	DISTortion	Displays dependent Distortion Meter.
	AFCounter	Displays dependent AF Counter.
	POWer	Displays RF Powe Meter.
	SINad	Displays dependent SINAD Meter.
	SCOPe	Displays dependent Oscilloscope.
	ANALyzer	Displays dependent Spectrum Analyzer.
	RFERror	Displays RF Error Meter.
:SCOPe		Displays independent Oscilloscope.
:SETup		Displays Setup Menu.
:TRUNKing	RADIOSimulation	Displays LTR Radio Simulator Screen.
	REPeater	Displays LTR Repeater Simulator Screen.
	AUXSetup	Displays LTR Auxiliary Setup Screen,

DUPLEX COMMANDS

DUPLex		
:LOCK b	0 or 1	Sets Offset Lock to OFF and ON.
:LOCK?		Queries Offset Lock state.
:OFFSet v[units]	.2500 to 1000.0000	Sets offset frequency. Assumed units are MHz. Valid units are Hz, kHz, MHz or GHz.
:RECAll v	0 to 49	Restores duplex screen values from specified storage location.
:STORe v	0 to 49	Stores current settings at specified location.
:LABel v,string	0 to 49	Attaches character string (0 to 8 characters) to specified storage location.
:LABel? v	0 to 49	Queries LABel for specified storage location.

FILTER COMMANDS

FILTer		
:SPEaker OFF		Sets Speaker Operation to OFF.
:BANDwidth		
:CMESsage		Sets Filter to C-Message Weighted Filter.
:WIDE		Sets Filter to Wideband.
:AUDio		Sets Internal Modulation as Speaker source. Valid only on Generate and Receive Operation Screens.
:SPEaker?		Queries current Speaker setting.
:MODMeter		
:HPASs v[units]	0, 300, 4000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.

FILTer		
:MODMeter		
:HPASs?		Queries Filter setting.
:BPASs	OFF	Sets Filter to OFF.
	CMESsage	Sets Filter to C-Message Weighted Filter.
:BPASs?		Queries Filter setting.
:LPASs v[units]	0, 300, 4000, 20000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:LPASs?		Queries Filter setting.
:AFDecode		
:HPASs v[units]	0, 300, 4000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:HPASs?		Queries Filter setting.
:BPASs	OFF	Sets Filter to OFF.
	CMESsage	Sets Filter to C-Message Weighted Filter.
:BPASs?		Queries Filter setting.
:LPASs v[units]	0, 300, 4000, 20000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:LPASs?		Queries Filter setting.
:AFCounter		
:HPASs v[units]	0, 300, 4000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:HPASs?		Queries Filter setting.
:BPASs	OFF	Sets Filter to OFF.
	CMESsage	Sets Filter to C-Message Weighted Filter.
:BPASs?		Queries Filter setting.
:LPASs v[units]	0, 300, 4000, 20000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
FILTer		
:AFCounter		
:LPASs?		Queries Filter setting.
:DATADecode		
:HPASs v[units]	0, 300, 4000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:HPASs?		Queries Filter setting.
:BPASs	OFF	Sets Filter to OFF.
	CMESsage	Sets Filter to C-Message Weighted Filter.
:BPASs?		Queries Filter setting.
:LPASs v[units]	0, 300, 4000, 20000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:LPASs?		Queries Filter setting.
:CLEar		Sets all filters to OFF. Does not affect speaker.

FORMAT COMMANDS

The format commands set data formats for transferring numeric information. The data format for response data may override the definition of FORMat.

EXAMPLE: Floating point requirements always override a non-base10 FORMat.

FORMat type		
ASCii		Returns all data (including integers and real numbers) as an ASCII representation. Numbers are returned in base 10.
BINary		Returns data encoded as numeric base 2, preceded by #B. Example: 15 is #B1111.
HEXadecimal		Returns data encoded as numeric base 16, preceded by #H. Example: 255 is #HFF.
INTeger		Returns ONLY block data encoded as 8 bit binary data with header and checksum.
OCTal		Returns data encoded as numeric base 8, preceded by #Q. Example: 255 is #Q377.

FUNCTION GENERATOR COMMANDS

FGENerator		
:ATTenuation b	0 or 1	Turning Attenuation on activates divide-by-100 attenuator.
:ATTenuation?		Queries Attenuation state.
:DATA		
:CODe v	#Q0 to #Q777	Sets octal Code Value for DCS/ (DCS Inverted).
:CODe?		Queries DCS/DCS Inverted octal Code Value.
:FORMat	DCS	Sets DATA Format to DCS.
	INVDCS	Sets DATA Format to DCS Inverted.
	INVPOC	Sets DATA Format to POCSAG Inverted.
	POCSag	Sets DATA Format to POCSAG.
:FORMat?		Queries DATA Format.
:LEVel v		Sets output level for DATA Generator. Value is dependent on status of Attenuation. Value is 0 to 2.5 Vp if OFF and 0 to .250 Vp if ON.
:LEVel?		Queries DATA Generator LEVel.
:POCSag		
:BAUD v	512, 1200, 2400	Selects Baud rate for POCSAG Generation.
:BAUD?		Queries POCSAG Baud rate.
:CAPCode v1[,v2]	0 to 9999999	Sets capcode range. v1 corresponds to start value and v2 corresponds to end value. Start value must be ≤ end value.
FGENerator		
:DATA		
:POCSag		
:CAPCode?		Queries current pocsag capcode.
:ENCode		Activates POGSAG Generation.
:MODE	BEEP1	Sets POCSAG Mode to 1 Beep.
	BEEP2	Sets POCSAG Mode to 2 Beep.
	BEEP3	Sets POCSAG Mode to 3 Beep.
	BEEP4	Sets POCSAG Mode to 4 Beep.
	NUMeric	Sets POCSAG Mode to Numeric.
	NUMSeq	Sets POCSAG Mode to Numeric Sequence.
	ANUM	Sets POCSAG Mode to Alpha-Numeric.

FGENerator		
:DATA		
:POCSag		
:MODE	ANUM_LC	Sets POCSAG Mode to Alpha-Numeric lower case.
	ANUM_UC	Sets POCSAG Mode to Alpha-Numeric upper case.
	ANUM_SPec	Sets POCSAG Mode to Alpha-Numeric special characters.
:MODE?		Queries POCSAG Mode.
:STATe b	0 or 1	Sets DATA Generator to ON or OFF.
:STATe?		Queries DATA Generator status.
:DTMF		
:CODe string		Sets DTMF Code where string is code.
:CODe?		Queries DTMF Code.
:ENCode		Starts DTMF burst message.
:LEVel v		Sets output level for DTMF Generator. Value is dependent on status of Attenuation. Value is 0 to 2.5 Vp if OFF and 0 to .250 Vp if ON.
:LEVel?		Queries DTMF Generator LEVel.
:MARK v	25 to 999	Sets Mark Time in ms.
:MARK?		Queries Mark Time.
:MODE	CONTinuous	Sets operation to continuous generation.
	BURSt	Sets operation to single burst.
:MODE?		Returns operation mode.
:PAUSe v	25 to 999	Sets Pause Time in ms.
:PAUSe?		Queries Pause Time.
:SPACe v	25 to 999	Sets Space Time in ms.
:SPACe?		Queries Space Time.
:STATe b	0 or 1	Sets DTMF Generator to ON or OFF.
:STATe?		Queries DTMF Generator status.
:GEN1		
:ENCode		Issues burst message of current format.
:FORMat		
:EEA string	0-9, A, G, R	Sets EEA Format with Code set to string.
:EIA string	0-9, A, G, R	Sets EIA Format with Code set to string.
:ZVEI string	0-9, A, G, R	Sets ZVEI Format with Code set to string.
:DZVei string	0-9, A, G, R	Sets DZVEI Format with Code set to string.
:DDZVei string	0-9, A, G, R	Sets DDZVEI Format with Code set to string.
:CCIR string	0-9, A, G, R	Sets CCIR Format with Code set to string.
:CCIRH string	0-9, A, G, R	Sets CCIRH Format with Code set to string.
:CCIRH4 string	0-9, A, G, R	Sets CCIRH4 Format with Code set to string.
:NATel string	0-9, A, G, R	Sets NATEL Format with Code set to string.
:EURo string	0-9, A, G, R	Sets EURO Format with Code set to string.
:TONE5_6 string	0-9, A, G, R	Sets 5/6 TONE Format with Code set to string.
:USER string	0-9, A-T	Sets USER Format with Code set to string.
:TONE10ps string	0-9, A-D, #, *	Sets 10 PS Format with Code set to string.
:TONE20ps string	0-9, A-D, #, *	Sets 10 PS Format with Code set to string.
:MTS string	0-9, A-D, #, *	Sets MTS Format with Code set to string.
:IMTS string	0-9, A-D, #, *	Sets IMTS Format with Code set to string.
:TREM		Sets Tone Remote Format.
:TONe		Sets Tone Format.
:FORMat?		Queries current GEN1 format.
:GEN1		
:FREQuency v		Sets GEN1 Frequency. Range of value is 5.0 to 20000.0 Hz for Sine Shape and Tone Format. 5.0 to 10000.0 Hz for other shapes and Tone Format. Selections for Tone remote are: 1950, 1850, 1350,1250, 2050, 1750, 1650,1550, 1450, 1150, or 1050 Hz.
:FREQuency?		Queries GEN1 frequency.
:LEVel v		Sets output level for Audio Generator 1. Value is dependent on status of Attenuation. Value is

FGENerator		
:GEN1		
:LEVel?		Queries Audio Generator 1 LEVel. 0 to 2.5 Vp if OFF and 0 to .250 Vp if ON.
:MODE	CONTinuous	Sets mode for continous operation.
	BURSt	Initiates a burst of current format.
:MODE?		Queries mode.
:STATe b	0 or 1	Sets Audio Generator 1 to ON or OFF.
:STATe?		Queries Audio Generator 1 status.
:SHAPe	SINe	Sets Shape to Sine.
	SQUare	Sets Shape to Square.
	RAMP	Sets Shape to Ramp.
	TRIangle	Sets Shape to Triangle.
:SHAPe?		Queries Shape.
:TIMe v	0 to 32.000	Sets burst time for Tone format in seconds.
:TIMe?		Queries Tone burst time.
:USER "char",v1,v2		Sets User Codes. "char" is 0 to 9 or A to T enclosed in quotes. Code frequency (v1) is 0.0 to 9999 Hz. Duration (v2) is 0.000 to 9.999 seconds.
:USER? "char"		Returns frequency and duration of specified code.
:GEN2		
:FREQuency v		Sets GEN2 Frequency. Range of value is 5.0 to 20000.0 Hz for Sine Shape and 5.0 to 10000.0 Hz for other shapes. Requires Option 04 for frequency other than 1000.0 Hz.
:FREQuency?		Queries Frequency.
:LEVel v		Sets output level for Audio Generator 2. Value is dependent on status of Attenuation. Value is 0 to 2.5 Vp if OFF and 0 to .250 Vp if ON.
:LEVel?		Queries Audio Generator 2 LEVel.
:SHAPe	SINe	Sets Shape to Sine.
	SQUare	Sets Shape to Square. Requires Option 04.
	RAMP	Sets Shape to Ramp. Requires Option 04.
	TRIangle	Sets Shape to Triangle. Requires Option 04.
:SHAPe?		Queries Shape.
:STATe b	0 or 1	Sets Audio Generator 2 to ON or OFF.
:STATe?		Queries Audio Generator 2 status.

GENERATOR COMMANDS

NOTE1: Set frequency to value. Assumed units are MHz. Valid optional units are Hz, kHz, MHz or GHz. Frequency range is from 0.0 to 1000.0000 MHz.

NOTE2: Set output level in DBM, uV, mV or V. Assumed units are dBm. Ranges are as follows:

UNITS	T/R	AUX w/o 20dB AMP	AUX w/20dBm AMP
DBM	-130 to -20	-130 to -13	-130 to 13
uV	0 to 999.9	0 to 999.9	0 to 999.9

UNITS	T/R	AUX w/o 20dB AMP	AUX w/20dBm AMP
mV	0 to 22.3	0 to 50.5	0 to 999.9
V	0 to 0.022	0 to 0.050	0 to 0.988

NOTE3: Cannot have FM and PM modulation chosen on two different function generator devices.

NOTE4: Must set the "MODE" before using this command.

GENerator		
:FREQuency v[units]	0.0 to 1000.0000	See NOTE 1.
:CELLular v	1 to 1023	Sets Cellular channel. See NOTE 4.
:CELLular?		Queries current Cellular channel.
:LIST v	0 to 99	Sets frequency list value. Refer to NOTE 4.
;FREQuency v1,v2[units]	0 to 99, 0.0 to 1000.0000	Sets frequency list value (v1) to frequency (v2). See NOTE 1.
:FREQuency? v	0 to 99	Queries frequency of specified frequency list value.
:LABel v,string	0 to 99	Attaches character string (®6 characters) to specified frequency list value.
:LABel? v	0 to 99	Queries LABel for specified frequency list value.
:LIST?		Queries frequency list value.
:MODE		
:CELLular	FORward	Sets cellular forward channel as MODE Type.
	REVerse	Sets cellular reverse channel as MODE Type.
:FIXed		Sets frequency as MODE Type.
:LIST		Sets Frequency LIST as MODE Type.
:TRUNKing	FORward	Sets trunking forward channel as MODE Type.
	REVerse	Sets trunking reverse channel as MODE Type.
:MODE?		Returns current MODE.
:TRUNKing v1,v2	1 to 760, 800 or 900	Sets Trunking Channel in specified band. See NOTE 4.
:TRUNKing?		Queries Trunking Channel.
:FREQuency?		Returns frequency in MHz.
:METer		
:ANALyzer		Sets Spectrum Analyzer on RF Generate Operation Screen.
:DISTortion		Sets Distortion Meter on RF Generate Operation Screen.
:SCOPe		Sets Oscilloscope on RF Generate Operation Screen.

GENerator		
:METer		
:SINad		Sets SINAD Meter on RF Generate Operation Screen.
:OUTPut		
:AUX		Sets AUX RF OUT Connector as output.
:DATA		
:AM		
[:MODulation]	0% to 100%	Sets AM Modulation Level.
[:MODulation]?		Queries AM Modulation Level.
:FM		
[:DEViation] v	0.0 to 100.0	Sets FM Deviation in kHz.
[:DEViation]?		Queries FM Deviation.
:MODulation	AM	Sets Modulation Type to AM.
	FM	Sets Modulation Type to FM. See NOTE 3.
	OFF	Sets Modulation Type to OFF.
	PM	Sets Modulation Type to PM. See NOTE 3.
:MODulation?		Queries Modulation Type.
:PM		
[:DEViation] v	0.0 to 10.0	Sets PM Deviation in Radians.
: [:DEViation]?		Queries PM Deviation.
:DTMF		
:AM		
[:MODulation]	0% to 100%	Sets AM Modulation Level.
[:MODulation]?		Queries AM Modulation Level.
:FM		
[:DEViation] v	0.0 to 100.0	Sets FM Deviation in kHz.
[:DEViation]?		Queries FM Deviation.
:MODulation	AM	Sets Modulation Type to AM.
	FM	Sets Modulation Type to FM. See NOTE 3.
	OFF	Sets Modulation Type to OFF.
	PM	Sets Modulation Type to PM. See NOTE 3.
:MODulation?		Queries Modulation Type.
:PM		
[:DEViation] v	0.0 to 10.0	Sets PM Deviation in Radians.
: [:DEViation]?		Queries PM Deviation.
:EXTernal		
:MODulation	AM	Sets Modulation Type to AM.
	FMNARR1	Sets Modulation Type to FM NAR 1. See NOTE 3.
	FMNARR2	Sets Modulation Type to FM NAR 2. See NOTE 3.
	FMNARR3	Sets Modulation Type to FM NAR 3. See NOTE 3.
	FMWIDE	Sets Modulation Type to FM WIDE. See NOTE 3.
	OFF	Sets Modulation Type to OFF.
	PMNARR1	Sets Modulation Type to PM NAR 1. See NOTE 3.
	PMNARR2	Sets Modulation Tyoe to PM NAR 2. See NOTE 3.
	PMNARR3	Sets Modulation Type to PM NAR 3. See NOTE 3.
:MODulation?		Queries Modulation Type.
:GATE	TR	Sets T/R Connector as output connector, as selected by MIC PTT switch.
	AUX	Sets AUX RF OUT Connector as output, as selected by MIC PTT switch.
:GEN1		
:AM		
[:MODulation]	0% to 100%	Sets AM Modulation Level.
[:MODulation]?		Queries AM Modulation Level.
:FM		
[:DEViation] v	0.0 to 100.0	Sets FM Deviation in kHz.
[:DEViation]?		Queries FM Deviation.

GENerator		
:OUTPut		
:GEN1		
:MODulation	AM	Sets Modulation Type to AM.
	FM	Sets Modulation Type to FM. See NOTE 3.
	OFF	Sets Modulation Type to OFF.
	PM	Sets Modulation Type to PM. See NOTE 3.
:MODulation?		Queries Modulation Type.
:PM		
[:DEViation] v	0.0 to 10.0	Sets PM Deviation in Radians.
: [:DEViation]?		Queries PM Deviation.
:GEN2		
:AM		
[:MODulation]	0% to 100%	Sets AM Modulation Level.
[:MODulation]?		Queries AM Modulation Level.
:FM		
[:DEViation] v	0.0 to 100.0	Sets FM Deviation in kHz.
[:DEViation]?		Queries FM Deviation.
:MODulation	AM	Sets Modulation Type to AM.
	FM	Sets Modulation Type to FM. See NOTE 3.
	OFF	Sets Modulation Type to OFF.
	PM	Sets Modulation Type to PM. See NOTE 3.
:MODulation?		Queries Modulation Type.
:PM		
[:DEViation] v	0.0 to 10.0	Sets PM Deviation in Radians.
: [:DEViation]?		Queries PM Deviation.
:LEVel v[units]		Sets Output level. See NOTE 2.
:LEVel?		Queries Output level.
:LEVel		
:UNITs	DBM	Sets UNITS for LEVel? command to dBm.
	UV	Sets UNITS for LEVel? command to µV.
	MV	Sets UNITS for LEVel? command to mV.
	V	Sets UNITS for LEVel? command to V.
:UNITs?		Queries UNITS Type.
:MIC		
:MODulation	AM	Sets Modulation Type to AM.
	FMNARR1	Sets Modulation Type to FM NAR 1. See NOTE 3.
	FMNARR2	Sets Modulation Type to FM NAR 2. See NOTE 3.
	FMNARR3	Sets Modulation Type to FM NAR 3. See NOTE 3.
	FMWIDE	Sets Modulation Type to FM WIDE. See NOTE 3.
	OFF	Sets Modulation Type to OFF.
	PMNARR1	Sets Modulation Type to PM NAR 1. See NOTE 3.
	PMNARR2	Sets Modulation Tyoe to PM NAR 2. See NOTE 3.
	PMNARR3	Sets Modulation Type to PM NAR 3. See NOTE 3.
:MODulation?		Queries Modulation Type.
:TR		Sets T/R Connector as output connector.
:OUTPut?		Queries selected output port.
:RECAll v	0 to 49	Restore GENERATE Screen values from specified location.
:STORe v	0 to 49	Stores current screen locations at specified location.
:LABel v,string	0 to 49	Attaches character string (0 to 8 characters) to specified storage location.
:LABel? v	0 to 49	Queries LABel for storage location.

GENerator		
:SWEep		
:ABORt		Stops Sweep Function.
:CONTinuous		Sets Sweep Function to Continuous Operation. Use ABORt to halt.
:INCRement v	0.0001 to 1000.0000	Sets Increment Frequency in MHz.
:INCRement?		Queries Increment Frequency.
:PAUSe v	0.0 to 9.5	Sets Pause time for Sweep Function in 0.5 second increments.
:PAUSe?		Queries Pause time for Sweep Function.
:ONCE		Sets Sweep Function for one pass. Use ABORt after pass.
:STARt v	0.0 to 1000.0000	Sets Start RF in MHz.
:STARt?		Queries Start RF.
:STOP v	0.0 to 1000.0000	Sets Stop RF in MHz.
:STOP?		Queries Stop RF.
GENerator		
:SWEep		
:RESUme		Continue sweeping where stopped or continue sweeping if in squelch mode.
:FREQuency?		Return current Sweep Function frequency in MHz.
:SWEep?		Queries Sweep Function Status. Returns 0 if off.

MEASURING COMMANDS

MEASure	Commands require specified meter be active.
:SINad?	Queries SINAD Meter reading.
:FM?	Queries FM Deviation Meter reading.
:PM?	Queries PM Deviation Meter reading.
:AM?	Queries AM Modulation Meter reading.
:RECLevel?	Queries Received Level Meter reading.
:AFCounter?	Queries AF Counter reading. Return value resolution is .1 Hz if input frequency is <500 Hz or gatetime is 10 sec. Otherwise resolution is 1 Hz.
:POWer?	Queries Power Meter reading.
:DVM?	Queries DVM reading.
:DISTortion?	Queries Distortion Meter reading.
:RFERror?	Queries RF ERROR Meter reading and input frequency. Resolution is 1 Hz if gatetime is 1 sec. Otherwise, resolution is 10 Hz.
:AFLevel?	Queries AF Level Meter reading.
:BER?	Initiates BER Meter, then queries BER Meter reading. BER Meter reading as string consists of mantissa, "EXP" and exponent.
INITiate	Initiates measurement of slow meters. SRQ indicates completion, if SRQ mask for meter is enabled.
:AFCounter	Starts AF Counter Measurement.
:RFERror	Starts RF Error Meter Measurement.
:BER	Starts BER Meter Measurement.
:TRUNKing	Starts next trunking decode.
FETCh	Returns value(s) created by INIT command, or error code -230.
:AFCounter?	Queries AF Counter reading.
:RFERror?	Queries RF ERROR Meter reading and input frequency. Resolution is 1 Hz if gatetime is 1 sec. Otherwise, resolution is 10 Hz.

FETCh		Returns value(s) created by INIT command, or error code -230.
:BER?		Queries BER Meter reading. BER Meter reading as string consists of mantissa, "EXP" and exponent.
:TRUNKing?		Returns decoded trunking data.

METER COMMANDS

METer		
:SINad		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:INPut	AUDIN	Sets input to AUDIO/DATA IN Connector.
	SCOPedvm	Sets Input to SCOP/DVM Connector.
:SINad		
:INPut?		Queries Input setting.
:LOWer v	0.0 to 30.0	Sets Lower Limit values in dB.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	15 or 30	Sets display range in dB.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UPPer v	0.0 to 30.0	Sets Upper Limit value in dB.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:FM		
[:DEViation]		
:ADJust		Performs FM-Z.
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:COUPLing	AC	Set Meter for AC Coupled operation.
	DC	Set Meter for DC Coupled operation.
:COUPLing?		
:LOWer v	0.0 to 99.99	Sets Lower Limit values in kHz.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value
:PEAKhold		

METer		
:FM		
[:DEViation]		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	2, 5, 10, 50, 100	Sets display range in kHz. Hz are also acceptable units.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UPPer v	0.0 to 99.99	Sets Upper Limit value in kHz.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:PM		
[:DEViation]		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:PM		
[:DEViation]		
:AVERage		
:STATe?		Queries Average state.
:LOWer v	0.0 to 9.99	Sets Lower Limit values in Radians.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	1, 2, 5, 10	Sets display range in Radians.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UPPer v	0.0 to 9.99	Sets Upper Limit value in Radians.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:AM		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:LOWer v	0.0% to 99.9%	Sets Lower Limit values.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.

METer		
:AM		
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	40% or 100%	Sets display range.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UPPer v	0.0% to 99.9%	Sets Upper Limit value.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:RECLevel		
:ADJust		Performs runtime adjustment. Requires external connection between ANTENNA Connector and T/R Connector for valid adjustment.
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 75	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:RECLevel		
:LOWer v		Sets Lower Limit values. Range of value is dependent on Receiver Attenuation and Units. If REC:INP:ATT is set to 30 dB, range is -80 to 0 dBm or 22.3 to 223606 µV. If REC:INP:ATT is set to 0 dB, range is -110 to -30 dBm or 0 to 70710 µV.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:UNITs	DBM	Sets units for meter to dBm.
	UV	Sets units for meter to µV.
:UNITs?		Return the units.
:UPPer v		Sets Upper Limit values. Range of value is dependent on Receiver Attenuation and Units. If REC:INP:ATT is set to 30 dB, range is -80 to 0 dBm or 22.3 to 223606 µV. If REC:INP:ATT is set to 0 dB, range is -110 to -30 dBm or 0 to 70710 µV.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:AFCounter		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.

METer		
:AFCounter		
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:GATE		
:TIME v	1 or 10	Sets Gate Time in seconds.
:TIME?		Queries Gate Time.
:INPut	AUDIN	Sets AF Counter Input to AUDIO/DATA IN Connector.
	RFPower	Sets AF Counter Input to RF Power line.
	EXTMod	Sets AF Counter Input to EXT MOD Connector.
	SCOPedvm	Sets AF Counter Input to SCOPE/DVM Connector.
:INPut?		Queries meter Input.
:LOWer v	0.0 to 20000.0	Sets Lower Limit values in Hz.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:AFCounter		
:RANGe v[units]	200, 2000, 20000	Sets display range. Assumed units are Hz, If kHz is specified, values are 0.2, 2 and 20.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UPPer v	0.0 to 20000.0	Sets Upper Limit value in Hz.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:AFLevel		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:IMPedance v	0 to 1000	Specify input impedance of user signal.
:IMPedance?		Queries impedance.
:LOWer v	0.00 to 10.00	Sets Lower Limit values in V.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	.05, .1, .2, .5, 1, 2, 5, 10	Sets display range. Assumed units are V, allowed units are mV and V.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.

METer		
:AFLevel		
:UNITs	DBM	Sets units for meter to dBm.
	VRMS	Sets units for meter to Vrms.
	DB	Sets units for meter to dB.
:UNITs?		Queries units setting.
:UPPer v	0.00 to 10.00	Sets Upper Limit value in V.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:POWer		
:ADJust		Zeroes Power Meter. Requires Power applied to T/R Connector be removed.
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 75	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:LOSS v	-9.9 to 9.9	Sets Cable Loss in dB.
:LOSS?		Queries Cable Loss value.
:LOWer v	0.0000 to 200.0000	Sets Lower Limit values in W.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:POWer		
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	.002, .005, .01, .02, .05, .1, .2, .5, 1, 2, 5, 10, 20, 50, 100,200	Sets display range. Assumed units are W, allowed units are mW and W.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UNITs	DBM	Sets units for meter to dBm.
	W	Sets units for meter to W.
:UNITs?		Queries units setting.
:UPPer v	0.0000 to 200.0000	Sets Upper Limit value in W.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:DVM		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:IMPedance v	2 to 1000	Specifies input impedance of user signal.
:IMPedance?		Queries impedance.
:INPut	AC	Sets meter input to ac coupled SCOPE/DVM

METer		
:DVM		
:INPut?		Queries DVM Meter input.
		Connector.
	AUDIN	Sets meter input to AUDIO/DATA IN Connector.
	DC	Sets meter input to dc coupled SCOPE/DVM
		Connector.
	EXTMod	Sets meter input to EXT MOD Connector.
	GROund	Sets meter input to GND coupled SCOPE/DVM
		Connector.
:LOWer v	0.000 to 200.000	Sets Lower Limit values in V.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	.05, .1, .2, .5, 1, 2	Sets display range. Assumed units are V,
	5, 10, 20, 50, 100, 200	allowed units are mV and V.
:RANGe?		Queries Range.
:UNITs	DBM	Sets units for meter to dBm.
	VRMS	Sets units for meter to Vrms.
	DB	Sets units for meter to dB.
:UNITs?		Queries units setting.
:UPPer v	0.000 to 200.000	Sets Upper Limit value in V.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:DISTortion		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:INPut	AUDIN	Sets meter input to AUDIO/DATA IN Connector.
:INPut?	SCOPedvm	Sets meter input to SCOPE/DVM Connector.
		Queries Distortion Meter input.
:LOWer v	0.0% to 20.0%	Sets Lower Limit values.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:UPPer v	0.0% to 20.0%	Sets Upper Limit value.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:RFERror		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.

METer		
:RFERror		
:ALARm		
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:GATE		
:TIME v	0.1 or 1.0	Sets Gate Time in seconds.
:TIME?		Queries Gate Time.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	.1, 1, 10, 100	Sets display range. Assumed units are kHz, allowed units are Hz and kHz.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UPPer v	0.0 to 100000.0	Sets Upper Limit value in Hz.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.

RECEIVER COMMANDS

NOTE1: Set frequency to value. Assumed units are MHz. Valid optional units are Hz, kHz, MHz or GHz. Accepted frequency range is from 0.0000 through 1000.0000 MHz in 0.1 kHz steps.

NOTE2: Must set the "MODE" before using this command.

RECeiver		
:BANDwidth v[units]	3, 15, 30, 300	Sets Receiver IF Bandwidth in kHz. 3 kHz requires Option 8. 30 kHz requires Option 3.
:BANDwidth?		Queries IF Bandwidth.
:DEMODulation	AM	Sets Demodulation to AM.
	FM	Sets Demodulation to FM.
	LB	Sets Demodulation to Lower SSB. Requires Option 8.
	PM	Sets Demodulation to PM.
	UB	Sets Demodulation to Upper SSB. Requires Option 8.
:DEMODulation?		Queries Demodulation type.
:FREQuency v[units]	0.0000 to 1000.0000	See NOTE 1.
:CELLular v	1 to 1023	Sets Cellular channel. See NOTE 2.
:CELLular?		Queries current Cellular channel.
:LIST v	0 to 99	Sets frequency list value. See NOTE 2.
:FREQuency v1,v2[units]	0 to 99, 0.0000 to 1000.0000	Sets frequency list value (v1) to frequency (v2). See NOTE 1.
:FREQuency? v	0 to 99	Queries frequency of specified frequency list value.
:LABel v,string	0 to 99	Attaches character string (®6 characters) to specified frequency list value.
:LABel? v	0 to 99	Queries LABel for specified frequency list value.
:LIST?		Queries frequency list value.
:MODE		
:CELLular	FORward	Sets cellular forward channel as MODE Type.
	REVerse	Sets cellular reverse channel as MODE Type.
:FIXed		Sets frequency as MODE Type.
:LIST		Sets Frequency LIST as MODE Type.
:TRUNKing	FORward	Sets trunking forward channel as MODE Type.
	REVerse	Sets trunking reverse channel as MODE Type.
:MODE?		Returns current MODE.
:TRUNKing v1,v2	1 to 760, 800 or 900	Sets Trunking Channel in specified band. See NOTE 2.
:TRUNKing?		Queries Trunking Channel.
:FREQuency?		Returns frequency in MHz.
:INPut		
:ANTenna		Selects Antenna input connector.
:ATTenuation v	0, 30	Sets input ATTenuation in dB.
:ATTenuation?		Returns input ATTenuation in dB.
:TR		Selects TR input connector.
:INPut?		Returns selected input connector.
[:METer]		
:ANALyzer		Sets Spectrum Analyzer on RF Receive Operation Screen.
:DEViation		Sets appropriate Modulation/Deviation Meter on RF Receive Operation Screen.
:DISTortion		Sets Distortion Meter on RF Receive Operation Screen.

RECeiver		
[:METer]		
:MODulation		Sets appropriate Modulation/Deviation Meter on RF Receive Operation Screen.
:SCOPe		Sets Oscilloscope on RF Receive Operation Screen.
:SINad		Sets SINAD Meter on RF Receive Operation Screen.
:OUTPut		
:DEMODulation	AFCounter	Sets DEMOD out routing to AFCounter.
	AFDecode	Sets DEMOD out routing to AF Decoder.
	CMESsage	Sets DEMOD out routing to C-Weighted filter.
	DETectout	Sets DEMOD out routing to RF Detector output.
	DATADecode	Sets DEMOD out routing to Data Decoder.
	MODMeter	Sets DEMOD out routing to Modulation/Meter.
:DEMODulation?		Queries DEMOD out routing.
:RECAll v	0 to 49	Restore RECEIVE screen values from specified location.
:SCAN		
:ABORt		Stops Scan function.
:CONTinuous		Sets Scan Function to Continuous Operation. Use ABORt to halt.
:DELay v	0.0 to 9.5	Sets Delay Time for Scan function in seconds.
:DELay?		Queries Delay Time for Scan function.
:INCRement v	1 to 99	Sets Increment value for Scan.
:INCRement?		Queries Scan increment value.
:LIST?		Queries current frequency list/channel number.
:PAUSe v	0.0 to 9.5	Sets Pause Time for Scan function in 0.5 second increments.
:PAUSe?		Queries Pause TIme for Scan function.
:ONCE		Sets Scan Function for one pass. Use ABORt after finished.
:RESUme		Continue Scan function where stopped or continue scanning if in squelch mode.
:STARt v		Sets Start frequency list/channel number. Range for v is 0 to 99 for Frequency List, 1 to 1023 for Cellular and 0 to 760 for Trunking.
:STARt?		Queries Start frequency list/channel number.
:STOP v		Sets Stop freq list/chan number. Range for v is 0 to 99 for Frequency List, 1 to 1023 for Cellular and 0 to 760 for Trunking.
:STOP?		Queries Stop frequency list/channel number.
:SCAN?		Queries whether Scan function is active.
:SQUelch		
:LEVel v	0 to 255	Sets squelch value. 0 is lowest squelch level.
:LEVel?		Queries squelch level.
:STATe?		Queries Squelch status. Returns 0 if squelched.
:STORe v	0 to 49	Stores current screen settings at stated location.
:LABel v,string	0 to 49	Attaches character string (0 to 8 characters) to specified storage location.
:LABel? v	0 to 49	Queries LABel for storage location.
:SWEep		
:ABORt		Stops Sweep Function.
:CONTinuous		Sets Sweep Function to Continuous Operation. Use ABORt to halt.
:DELay v	0.0 to 9.5	Sets Delay time for Sweep Function in seconds.
:DELay?		Queries Delay time.
:INCRement v	0.0001 to 1000.0000	Sets Increment Frequency in MHz.
:INCRement?		Queries Increment Frequency.
:PAUSe v	0.0 to 9.5	Sets Pause time for Sweep Function in seconds.

RECeiver		
:SWEep		
:PAUSe?		Queries Pause time for Sweep Function
:ONCE		Sets Sweep Function for one pass. Use ABORt after pass.
:STARt v	0.0000 to 1000.0000	Sets Start RF in MHz.
:STARt?		Queries Start RF.
:STOP v	0.0000 to 1000.0000	Sets Stop RF in MHz.
:STOP?		Queries Stop RF.
:RESUme		Continues sweeping where stopped or continue sweeping if in squelch mode.
:FREQuency?		Returns current Sweep Function frequency in MHz.
:SWEep?		Queries Sweep Function Status. Returns 0 if off.
:VOLume v	0 to 255	Sets volume level. 0 is lowest value.
:VOLume?		Queries volume setting.

SCOPE COMMANDS

SCOPe		
:INPut	DC	Sets Input to dc coupled SCOPE/DVM Connector.
	AC	Sets Input to dc coupled SCOPE/DVM Connector.
	GROund	Sets Input to dc coupled SCOPE/DVM Connector.
	EXTMOD	Sets input to EXT MOD Connector. Valid in Generate Mode only.
	AUDIN	Sets AUDIO/DATA IN Connector as input. Valid in Generate Mode only.
	AUDOUT	Sets AUDIO/DATA GEN Connector as input.
	INTMOD	Sets internal modulation as Input. Valid in Generate Mode only.
	NOTCh	Sets Notch Residual as Input. Not valid with Independent Oscilloscope.
	AFCounter	Sets AF Counter line as input. Valid in Receive Mode only.
	AFDecode	Sets AF Decode/Sinad line as input. Valid in Receive Mode only.
	DATADecode	Sets DATA Decoder line as input. Valid in Receive Mode only.
	RFPower	Sets RF Power line as input. Valid in Receive Mode only.
	DETectout	Sets Detector Out line as input. Valid in Receive Mode only.
	DEMODout	Sets DEMOD Connector as input. Valid in Receive Mode only.
	MODMeter	Sets Mod Meters as input. Valid in Receive Mode only.
:INPut?		Queries Input setting. Mode returned refers to Independent Oscilloscope. Returned modes are AC, DC or GND.
:VERTical v	0 to 255	Sets screen vertical offset in pixels.
:VERTical?		Queries Vertical offset.
:HORizontal v	-10 to 10	Sets horizontal offset in major divisions.
:HORizontal?		Queries offset.
:MARKer		
:STATe b	0 or 1	Sets Marker to ON or OFF.
:STATe?		Queries status of marker.
:TIMe v		Sets Marker Placement in time. Value is dependent on Sweep setting and Horizontal offset. Marker must be placed in visible screen.
:TIMe?		Queries current Marker location.

SCOPe		
:MODE	AVERage	Sets Mode to Average.
	COMPare	Sets Mode to Compare.
	LIVE	Sets Mode to LIVE.
	RECAll	Recalls stored trace.
	STORe	Stores current trace in memory.
:MODE?		Queries Mode Type.
:SCALe v[units]		Sets Vertical Scale. Default units are V. Valid units are V and mV. Values include; 10, 20, 50, 100, 200, 500 mV, 1, 2, 5, 10, 20 and 50 V.
:SCALe?		Returns vertical scale with units.
:SWEep[:TIME] v[units]		Sets duration of sweep per division. Assumed units are ms. Valid units are µs (US) and ms (MS). Accepted values are 100, 200, 500 µs, 1, 2, 5, 10, 20, 50 and 100 ms.
:SWEep[:TIME]?		Returns SWEep setting with units.
:TRACe		
:DATA?[v1,v2,v3]		Queries current data trace values. v1 specifies Mode (0[live], 1[recall]). v2 specifies start point in pixels, with range of 0 to 499. v3 specifies number of returned points in pixels with range of 0 to 499, where v1 + v2 ®500. Defaults are 0,0,500.
:TRIGger		
:ARM		Arms Trigger for Singleshot Mode.
:LEVel v	0 to 255	Sets trigger level.
:LEVel?		Queries trigger level.
:MODE	AUTO	Sets Trigger Mode to automatic.
	SINGleshot	Sets Trigger Mode to Singleshot.
	NORMal	Sets Trigger Mode to Normaiized.
:MODE?		Queries Trigger Mode setting.

STATUS COMMANDS

See Status Bit definitions and SCPI manuals for further descriptions.

STATus	
:OPERation	
:CONDition?	Returns operation condition register.
:ENABle v	Sets enable mask in event register.
:ENABle?	Returns state of event register's enable bit.
:EVENt?	Returns, then clears operation's event register.
:INSTrument	
:CONDition?	Queries Operation complete status-1.
:EBIT	Sets extension bits.
:CONDition?	Returns operation complete status-2.
:ENABle v	Sets enable mask in INST EBIT EVENt register.
:ENABle?	Queries enable mask in INST EBIT EVENt register.
:EVENt?	Queries INSTrument EBIT EVENt register.
:ENABle v	Sets enable mask in INSTrument EVENt register.
:ENABle?	Queries enable mask in INSTrument EVENt register.
:EVENt?	Queries INSTrument EVENt register.
:MEASuring	
:CONDition?	Returns operation measuring status-1.

STATus		
:OPERation		
:MEASuring		
:EBIT		
:CONDition?		Returns operation measuring status-2.
:ENABle v		Set enable mask in MEAS EBIT EVENt register.
:MEASuring		
:ENABle?		Queries enable mask in MEAS EBIT EVENt register.
:EVENt?		Queries MEAS EBIT EVENt register.
:ENABle v		Sets enable mask in MEAS EVENt register.
:ENABle?		Queries enable mask in MEAS EVENt register.
:EVENt?		Queries MEAS EVENt register.
:PRESet		Initializes enable and transition filter registers for SCPI mandated data structures.
:QUEStionable		
:CONDition?		Queries QUEST CONDition register.
:ENABle v		Sets enable mask in QUES EVENt register.
:ENABle?		Queries enable mask in QUES EVENt register.
:EVENt?		Queries QUEST EVENt register.
:INSTrument		
:CONDition?		Returns questionable status-1.
:EBIT		
:CONDition?		Returns questionable status-2.
:ENABle v		Sets enable mask in QUES INST EBIT EVENt register.
:ENABle?		Queries enable mask in QUES INST EBIT EVENt register.
:EVENt?		Queries QUES INST EBIT EVENt register.
:ENABle v		Sets enable mask in QUES INST EVENt register.
:ENABle?		Queries enable mask in QUES INST EVENt register.
:EVENt?		Queries QUES INST EVENt register.

SYSTEM COMMANDS

SYSTem		
:ERRor?		Returns error code + error message. Refer to para 5-5 for codes/messages.
:VERSion?		Returns version of SCPI used.
:KEY v		Sends keycode to execute. Refer to para 5-6 for definitions.
:STARt		Sends start key.
:STOP	Sends stop key.	
:KEY?		Returns key pressed or -1 if none.
:KLOCk b	0 = off, 1 = on	OFF enables front panel keyboard usage. SYST:SEC OFF must be sent before setting this command to OFF. ON disables front panel keyboard.
:KLOCk?		Returns keyboard lock state.
:COMMunicate		
:SERial		
:BAUD v	110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400	Sets Baud rate.
:PARity xxx	EVEN, ODD, NONE	Sets Data Parity.
:BITS v	7 or 8	Sets Data Bits.
:SBITs v	1 or 2	Sets Stop Bits.
:PACE	XON, NONE	Sets XON/XOFF handshake control.

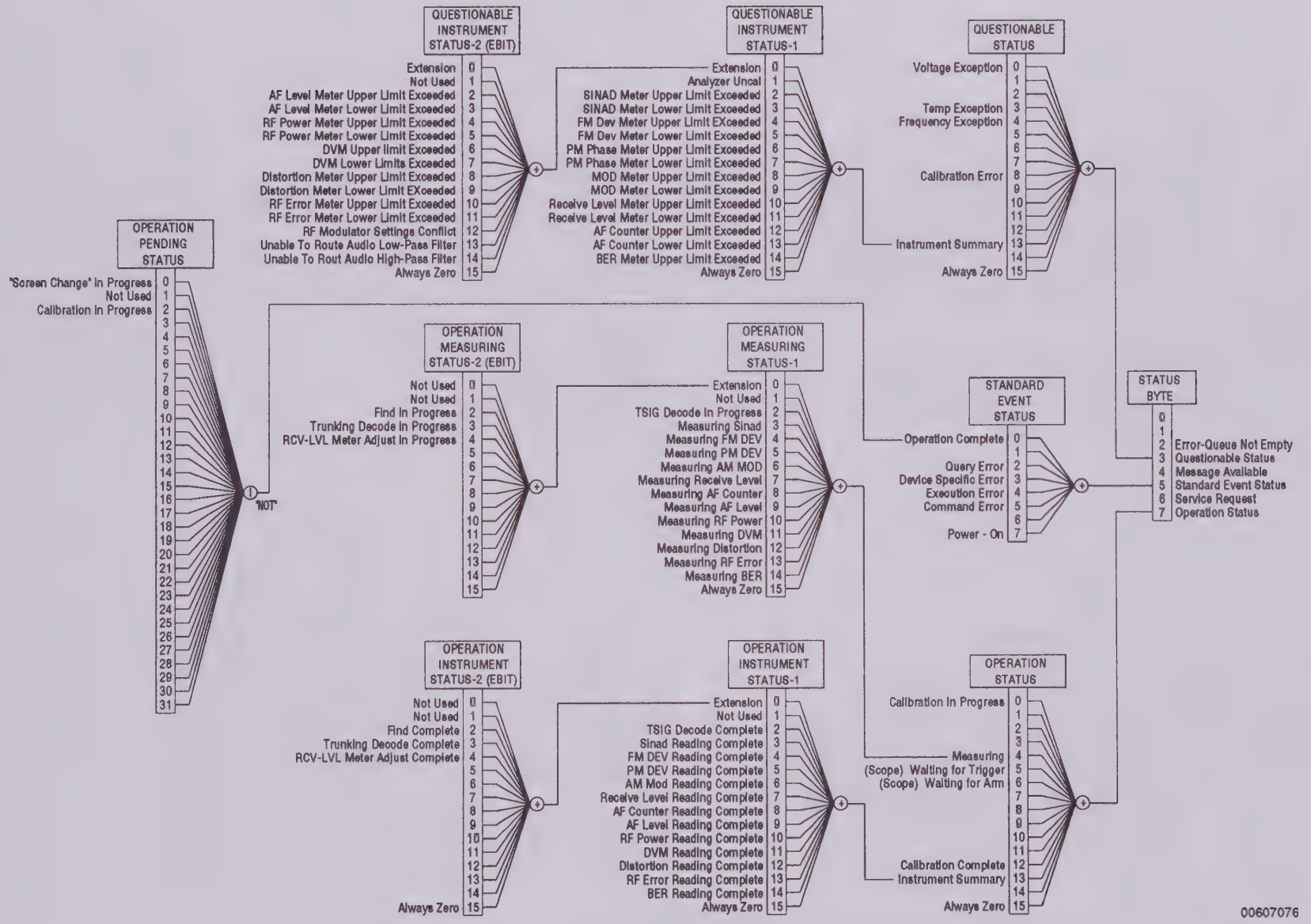
SYSTem		
:COMMunicate		
:SERial		
:CONTrol:		
RTS xxx	ON, STANdard, RFR	Sets hardware handshake control.
:ECHO b	0 = off, 1 = on	Sets RCI ECHO on/off.
:ECHO?		Returns RCI ECHO state.
:GPIB		
:ADDRess v	1 to 30	Sets GPIB Address.
:DATE v,v,v		Sets numeric year, month and day.
:DATE?		Query numeric year, month and day.
:TIME v,v,v		Sets numeric hour, minute and second.
:TIME?		Query numeric hour, minute and second.
:SECurity		Refer to SCPI Volume 1 manual.
[:STATe] b	0 = off, 1 = on	Sets SECurity STATe.
[:STATe]?		
:SECurity?		

TRUNKING COMMANDS

These commands require Option 14, CLEARCHANNEL LTR™ be installed.

TRUNKing		
:BORDer v	0 or 1	Sets Border Offset to DISABLED or ENABLED.
:BORDer?		Queries Border Offset state.
:FREEChan v	1 to 760	Sets Free Repeater channel number.
:FREEChan?		Queries Free Repeater channel number.
:RADIOSimulation		
:CHANnel v	1 to 760	Sets Channel Number for testing.
:CHANnel?		Queries Channel Number.
:BAND	800 or 900	Sets Bandwidth in MHz.
:BAND?		Queries Bandwidth.
:AREA b	0 or 1	Sets Area Bit ON or OFF.
:AREA?		Queries Area Bit setting.
:INUSe v	0 to 31	Sets Inuse Number.
:INUSe?		Queries Inuse Number.
:HOME v	0 to 31	Sets Home Repeater Number
:HOME?		Queries Home Repeater Number.
:GROUP v	0 to 255	Sets Group Number.
:GROUP?		Queries Group Number.
:FREE v	0 to 31	Sets Free Repeater Number.
:FREE?		Queries Free Repeater Number.
:ENCode		Starts Test.
:REPeater		
:MODE	FREE	Sets Mode to Free Home Repeater.
	BUSY	Sets Mode to Busy Home Repeater.
:MODE?		Queries simulation mode type.
:CHANnel v	1 to 760	Sets Channel Number for testing.
:CHANnel?		Queries Channel Number.
:BAND	800 or 900	Sets Bandwidth in MHz.
:BAND?		Queries Bandwidth.
:AREA b	0 or 1	Sets Area Bit ON or OFF.
:AREA?		Queries Area Bit setting.
:GOTO v	0 to 31	Sets Goto Number.
:GOTO?		Queries Goto Number.
:HOME v	0 to 31	Sets Home Repeater Number
:HOME?		Queries Home Repeater Number.
:GROUP v	0 to 255	Sets Group Number.

TRUNKing		
:REPeater		
:GROUP?		Queries Group Number.
:FREE v	0 to 31	Sets Free Repeater Number.
:FREE?		Queries Free Repeater Number.
:ENCode		Starts Test.
:RICGroup v	1 to 250	Sets Radio RIC ID.
:RICGroup?		Queries Radio RIC ID.
:SYNC v	#H0 TO #H1FF	Sets System Sync value.
:SYNC?		Queries System Sync value.



COM-120B Status Event Registers

5-5 ERROR CODES

ERROR CODE	ERROR DESCRIPTION
100	COMMAND ERROR
102	SYNTAX ERROR
108	PARAMETER NOT ALLOWED
109	MISSING PARAMETER
151	INVALID STRING DATA
160	BLOCK DATA ERROR
161	INVALID DATA BLOCK
170	EXPRESSION ERROR
180	MACRO ERROR
181	INVALID OUTSIDE MACRO DEFINITION
183	INVALID INSIDE MACRO DEFINITION
200	EXECUTION ERROR
221	SETTINGS CONFLICT
222	DATA OUT OF RANGE
223	TOO MUCH DATA
225	OUT OF MEMORY
230	DATA CORRUPT OR STALE
240	HARDWARE ERROR
241	HARDWARE MISSING; OPTION
250	MASS STORAGE ERROR
256	FILE NAME NOT FOUND
261	MATH ERROR IN EXPRESSION
272	MACRO EXECUTION ERROR
273	ILLEGAL MACRO LABEL
274	MACRO PARAMETER ERROR
278	MACRO HEADER NOT FOUND; UNDEFINED MACRO
282	ILLEGAL PROGRAM NAME; TASK NAME
283	ILLEGAL VARIABLE NAME
330	SELF-TEST FAILED
350	QUEUE OVERFLOW; TOO MANY ERRORS
400	QUERY ERROR

Error codes will cause the follow bits to be set:

ERROR CODES	BIT IN STANDARD EVENT STATUS
100 to 199	Bit5 - COMMAND ERROR
200 to 299	Bit4 - EXECUTION ERROR
300 to 399	Bit3 - DEVICE SPECIFIC ERROR
400 to 499	Bit2 - QUERY ERROR

5-6 KEY CODE DEFINITIONS

NOTE: SYSTEM:KEY? returns -1 if no key has been pressed.

DESCRIPTION	KEY	CODE
** Memory Keys	STORE KEY	0x80
	RCL KEY	0x81
** Screen Select Keys	SHOW LIST KEY	0x84
	REC KEY	0x86
	GEN KEY	0x87
	AUDIO GEN KEY	0x88
	SCOPE KEY	0x89
	MTRS KEY	0x8A
	DPLX KEY	0x8C
	SETUP KEY	0x8D
	ANLYZ KEY	0x8E
	SPCL TEST KEY	0xC4
** Define the cursor keys for the non-edit mode.	FIELD CURSOR UP KEY	0x90
	FIELD CURSOR LEFT KEY	0x91
	FIELD CURSOR RIGHT KEY	0x92
	FIELD CURSOR DOWN KEY	0x 93
** Scroll keys	CHARACTER CURSOR LEFT KEY	0x12
	CHARACTER CURSOR RIGHT KEY	0x13
	SCROLL CURSOR UP KEY	0x14
	SCROLL CURSOR DOWN KEY	0x 15

DESCRIPTION	KEY	CODE
** Softkeys	SOFTKEY 1	0x01
	SOFTKEY 2	0x02
	SOFTKEY 3	0x03
	SOFTKEY 4	0x 04
	SOFTKEY 5	0x05
	SOFTKEY 6	0x06
** Data entry keys	DATA KEY 0	0x30
	DATA KEY 1	0x31
	DATA KEY 2	0x32
	DATA KEY 3	0x33
	DATA KEY 4	0x34
	DATA KEY 5	0x35
	DATA KEY 6	0x36
	DATA KEY 7	0x37
	DATA KEY 8	0x38
	DATA KEY 9	0x39
	ENTER KEY	0x0D
	#	0x23
	*	0x2A
	+/-	0x2D
	•	0x2E
** Control keys	TAB KEY	0x09
	ESC KEY	0x1B
	START/STOP KEY	0x8F

SECTION 6 - GENERAL TMAC (Test Macro Language)

6-1 SYNTAX

When working with TMAC, punctuation marks are used to establish a format of how commands and parameters are entered. The syntax needed to use TMAC is detailed below.

TMAC commands are arranged in hierarchical levels using the colon to separate the different levels. A colon before the beginning of a command signifies the command starts at the first hierarchical level.

Example: FGEN:GEN1:SHAPE:SIN

FGEN precedes all Function Generator commands. The **FGEN:GEN1** precedes all Function Generator commands dealing with Generator 1. **FGEN:GEN1:SHAPE** precedes all Function Generator commands selecting the waveform of Generator 1. **FGEN:GEN1:SHAPE:SIN** selects a sine wave for the waveform of Generator 1 of the Function Generator.

A carriage return marks the end of a command and places the next command at the first command level. A semicolon signifies the end of a command and starts the next command at the last command level of the previous command.

Example: FGEN:GEN1:FREQ 2000;SHAPE:SIN;:SCREEN:FUNC

The first command, **FGEN:GEN1:FREQ 2000**, leaves the TMAC Compiler at the **FGEN:GEN1** level. Preceded by a semicolon, the next command, **SHAPE:SIN**, starts from this level. The next semicolon leaves the TMAC Compiler at the **FGEN:GEN1:SHAPE** level. The following colon resets the Compiler to the first hierarchical level to start the next command, **SCREEN:FUNC**.

Example: DUP:INP:FREQ?;MOD:USER:DATA;FILTER 30;:SCREEN:DUP

This command line performs the following commands:

DUP:INP:FREQ?
DUP:INP:MOD:USER:DATA
DUP:INP:FILTER 30
SCREEN:DUP

At least one space is needed between commands and parameters, other spaces or lack of them do not affect command execution. Commas are used between parameters when more than one is listed.

Example: MACRO 1,2,3,4

A back slash (\) allows a command to be continued on the next line. The back slash cannot break a command word.

Example: FGEN:GEN1:\
FREQ 2000

This is the same command as **FGEN:GEN1:FREQ 2000**.

Example: FGEN:GE\
N1:FREQ 2000

This command fails to execute and produces an error message because command word **GEN1** is broken.

Many commands can be entered using a short form or a long form. In this manual, the short form is shown in upper case, while the remainder of the long form is shown in lower case. Upper and lower case letters are used only in this manual to differentiate between the long and short form of commands. TMAC does not differentiate between upper and lower case letters; therefore entries can be either.

Example: STATus:QUEStionable:CONDition?

STAT:QUES:COND? is the same as **STATUS:QUESTIONABLE:CONDITION?**

6-2 COMMENTS

Comments provide clarity in macros and are ignored by the TMAC compiler. There are two types of comments.

Characters // cause the rest of line to be a comment.

Example: PRINT COS(freq*SQR(2)) // PRINTS COS OF FREQ × SQUARE ROOT OF 2

The message PRINTS COS OF FREQ × SQUARE ROOT OF 2 is not executed by the TMAC compiler.

Characters /* and */ start and end the second type of comment. It can contain several lines.

Example: PRINT COS(freq*SQR(2)) /* prints the cosine of the quantity RF Generator frequency multiplied by the square root of 2 */

The TMAC compiler ignores everything between the comment characters.

6-3 VARIABLES AND ARRAYS

6-3-1 GENERAL

Variables and arrays are used to hold numeric values and can be local or global. If a variable or array is declared inside a macro, it is local and is used inside that macro only. If it is declared outside a macro, it is global and is used outside or inside any macro.

The number of variables and arrays allowed is limited by the amount of memory available. There is a maximum of 256 memory locations for global variables. A global variable takes one location, global arrays take a location for each array element and global string variables take 9 locations each. Local variables are also limited by memory space which varies depending on many factors. One to two hundred local variables are usually available with arrays taking the space of a variable for each array element and string variables taking 9 times the space needed for a variable.

The first character of a variable or array name is a letter while the remaining characters can be letters, digits 0 through 9 and the underscore. The maximum length is 31 characters. There are 26 free variables that do not need to be declared. These have the single letter names A through Z. To declare a variable, use the **VAR** command:

VAR *name, name,..... ,name*

Example: VAR Freq,Rad,Mod

Freq, *Rad* and *Mod* are now declared variables.

Variables can be initialized when they are declared by including an equal sign and the value. Variables are equal to 0 when declared if not changed by the user.

Example: VAR Rad = 4.32876, Mod

Rad is declared and assigned a value of 4.32876. Mod is declared and contains a value of 0.

Arrays are also declared using the VAR command. The highest index is included in brackets as shown:

VAR *name*[*index*]

The index count starts with 0, making *index* one less than the total number of variables in the array.

Example: VAR BB[9]

This command declares array BB with 10 variables: BB[0] through BB[9].

Braces are used to initialize arrays. More than one can be initialized at a time.

Example: VAR BUNCH[10] = {1,2,3,4,5,6,7,8,9,10,11}

Example: VAR AA[2]={1,2,3}, BB[1]={7,4}, CC[3]={24, 345.754, 2, 100}

A variable and an array cannot have the same name at the same time. Accessing an array without specifying an index yields erroneous results.

6-3-2 SAVING VARIABLES AND ARRAYS

Global variable and array values are not saved in memory when the Test Set power is turned off. To save variable or array values in non-volatile memory, use the **NVSAV** command. To recall a variable, use the **NVRCL** command:

NVSAV *name,location*

NVRCL *name,location*

name is the name of the variable or array and *location* is the memory location. Each variable uses one memory location and arrays use a memory location for each value. Free variables, local variables and local arrays cannot be saved in non-volatile memory.

Example: VAR DD
NVSAV DD,10

DD is now saved in non-volatile memory location 10. To recall DD, use the NVRCL command.

Example: NVRCL DD,10

The content of memory location 10 is loaded into variable DD.

When an array is saved using the **NVSAV** command, the whole array is saved in consecutive memory locations.

Example: VAR list[5]
NVSAV list,1

The values of list are saved in memory locations 1 through 6 (6 values starting at 1). Arrays are recalled the same as variables.

Example: NVRCL list,1

The contents of memory locations 1 through 6 are loaded into list[0] through list[5].

NOTE: Overwriting previously used memory locations deletes previous entries.

```
Example: VAR List[4]={2,4,6,8,10}      // Declares an array named List.
         VAR Group[2]={23,46,69}       // Declares an array named Group.
         NVSAV List, 10                // Saves List in memory locations
                                       // 10 through 14.
         NVSAV Group,12                // Saves Group in memory locations
                                       // 12 through 14.
```

```
NVRCL List,10                    // Recalls memory locations 10 through
                                 // 14 and assigns the values to List.
```

Three of the saved values of List were lost when the same memory locations were used to save the array Group.

6-4 CONSTANTS AND DATA ARRAYS

Constants are declared using the **CONST** command. Constants are global only and cannot be declared inside a macro.

CONST *name, expression, name, expression,..., name, expression*

A constant *name* starts with a letter while the remaining characters can be letters, numbers and the underscore. A constant *name* can be 2 to 31 characters in length.

Example: CONST PI, 3.1415, FREQ, 3000

String data cannot be assigned to a constant. Expressions do not have to be in simplest form.

Example: CONST AA,(4+6)/2

AA is set equal to 5.

Once a constant is declared with the **CONST** command, it is changed only with another **CONST** command.

Example:
```
CONST AA,36
AA=20
```

The second command results in an error message and is not performed, leaving AA equal to 36.

Data arrays are declared using the **DATA** command:

DATA *name* = {*expression, expression,..., expression*}

A data array *name* starts with a letter while the remaining characters can be letters, numbers and the underscore. A data array *name* can be 2 to 31 characters in length.

Example: DATA offsets_1 = {2,3,4,5,6,7,8,9}

Like a constant, data arrays cannot be assigned string data nor do expressions have to be in their simplest form. Once a data array is declared, it is changed only by another **DATA** command. Contents of **DATA** arrays are accessed using the index enclosed in brackets.

Example:
```
DATA Points = {11.6, 17.3, 22.4, 27.1}
Y = Points[2]
```

Variable Y is set equal to 22.4.

6-5 NUMERIC FORMATS

6-5-1 NUMERICAL NOTATION

Numerals are expressed as fixed point decimal, scientific notation or as an integer. Numerals are specified as negative with a - character as shown:

Example: -51

This denotes a negative 51.

The maximum fixed point decimal numeral that can be entered is ⌠2147483647. Scientific notation uses the letter e to denote an exponent of 10.

Example: 54e7

This number signifies 54 multiplied by 10 to the 7th power or 540,000,000.

100 is the maximum power of 10 that can be entered, although the maximum number in scientific form allowed is + 1.797693e308. Numbers with a larger power of 10 than 100 are assigned to a variable by multiplying powers of 10.

Example: Large = 54e7*1e100*1e100

This example has set variable Large equal to 54e207 or 54 multiplied by 10 to the 207th power.

NOTE: For execution reasons, the COM-120B uses a single precision floating point numbers e.g. 1e±38.

6-5-2 NUMERIC FORM

To enter data in a different format (base 2, 8 or 16), precede data with one of the following characters:

Binary	#B
Octal	#Q
Hexadecimal	#H

Data format for the returned data for queries is changed to base 2, 8, 10 or 16 using the **FORMat** command. The default format is base 10.

FORMat BIN	Data is returned in base 2 format.
FORMat OCTal	Data is returned in base 8 format.
FORMat HEXadecimal	Data is returned in base 16 format.

FORMat ASCii Data is returned in base 10 format.

Data received from the Test Set in binary, octal or hexadecimal form is preceded by #B, #Q or #H notation. Data in scientific notation is not affected by these commands.

6-6 MATHEMATICAL OPERATORS

TMAC provides a variety of mathematical operators and bit manipulating functions to perform mathematical operations. A 32 bit word is used for binary and bitwise operations.

6-6-1 OPERATORS

= Assignment operator

Assigns a value to a variable. Variable on the left of the = operator is the given value computed for the expression on the right.

Example: x=2; Mod = w * 2 + z

The assignment operator does not denote an equation.

Example: x = x + 2

Assigns a new value to x, 2 greater than the previous value.

** Exponential operator (does not conform to SCPI Standard)

Consists of two consecutive asterisks.

Example: y=4**-2; MM = NN**4; Freq = C**D;

The first example sets y equal to 4 raised to the -2 power. The second example sets MM equal to NN raised to the 4th power. The third example sets Freq equal to C raised to the D power.

* Multiplication operator

Example: x=4*6; T = 25*S; JJ = K*LL

The first example sets x equal to 4 multiplied by 6. The second example sets T equal to 25 multiplied by the value of S. The third example sets JJ equal to the value of K multiplied by the value of LL.

/ Division operator

Example: Y=8/3.867; Z = x/7; P = Q/R

The first example sets y equal to 8 divided by 3.867. The second example sets Z equal to value of x divided by 7. The third example sets P equal to the value of Q divided by the value of R.

NOTE: A command to divide by zero results in an error message.

+ Addition operator and positive unary operator

Example: G=4+F; AA = B1 + B2, +X

The first example sets G equal to 4 added to the value of F. The second example sets AA equal to the value of B1 added to the value of B2. The last example is the value of X.

- Subtraction operator and negative unary operator

Example: H= I-5; V = U-T, -B

The first example sets H equal to 5 subtracted from the value of I. The second example sets V equal to the value of T subtracted from the value of U. The last is the negative or opposite value of B.

% Modulo operator (Does not conform to SCPI Standard)

The modulo operation returns the integer truncated remainder of a division operation. If operands are not integers, they are truncated first.

Example: x=7%3; RR=16%4; N = 20.5%3.3; M = 27%L;

The first example sets x equal to 7 modulo 3 (1). The second example sets variable RR equal to 16 modulo 4 (0). The third example sets N equal to 20 modulo 3 (2). The fourth example sets M equal to 27 modulo the value of L.

— Decrement and ++ Increment operators

The decrement operator subtracts 1 from the value of a variable either before or after execution of the command it is included in. The increment operator acts in the same manner, except it adds instead of subtracts.

—*variable*	Decrements variable before execution of the command.
variable—	Decrements variable after execution of the command.
++*variable*	Increments variable before execution of the command.
variable++	Increments variable after execution of the command.

Example:
```
y = 7
x = —y
```

The x = —y command subtracts 1 from y and then sets x equal to this value. After the second command is executed, x and y equal 6.

Example: y = 7
x = y++

The x = y++ command sets x equal to the y value (7) and then adds 1 to y. After the command is executed, x equals 7 and y equals 8.

~ Bitwise complement

The bitwise complement operation inverts the binary representation of the operand using the twos complement form of negative numbers.

Example: X = ~6

0110 (6) is inverted to 1001 (twos complement of -7) and -7 is loaded into X.

! Logical negation (NOT) unary operator

Reverses the truth value.

Example: !D

The example is true when D equals 0.

¦ Bitwise OR

Operator performs OR operation on each bit of the binary representation of the two operands and returns the result in the operands original form. OR Operation Results Table lists the bit combinations and their OR operation results.

operand 1	operand 2	OR result
0	0	0
0	1	1
1	0	1
1	1	1

OR Operation Results Table

Example: y = 4 ¦ 2

OR
$$\begin{array}{r} 4 \\ 2 \\ \hline 6 \end{array} \qquad \begin{array}{r} 100 \\ 010 \\ \hline 110 \end{array}$$

The left bit of 4 (100) and 2 (010) are 1 and 0, providing an OR result of 1. The middle bits are 0 and 1, providing an OR result of 1. The right bits are both 0, providing an OR result of 0 and setting y equal to 6 (110).

Example: Z = 12 ¦ 10

```
      12      1100
OR    10      1010
      14      1110
```

& Bitwise AND

Operator performs AND operation on each bit of the binary representation of two operands and returns the result in the operands original form. AND Operation Results Table lists the bit combinations and their AND operation results.

operand 1	operand 2	AND result
0	0	0
0	1	0
1	0	0
1	1	1

AND Operation Results Table

Example: JJ = 4 & 6

```
       4      1 0 0
AND    6      1 1 0
       4      1 0 0
```

The left bit of 4 (100) and 6 (110) are 1, providing an AND result of 1. The middle bits are 0 and 1, providing an AND result of 0. The right bits are both 0, providing an AND result of 0 and setting JJ equal to 4 (100).

Example: w = 12 & 10

```
      12      1 1 0 0
AND   10      1 0 1 0
       8      1 0 0 0
```

^ Bitwise XOR (conflicts with SCPI Standard for Expontential operator)

Operator performs XOR operation on each bit of the binary representation of two operands and returns the result in the operands original form. XOR Operation Results Table lists the bit combinations and their XOR operation results.

operand 1	operand 2	XOR result
0	0	0
0	1	1
1	0	1
1	1	0

XOR Operation Results Table

Example: y = 4 ^ 6

```
     4      1 0 0
XOR  6      1 1 0
     2      0 1 0
```

The left bit of 4 (100) and 6 (110) are 1 providing a XOR result of 0. The middle bits are 0 and 1, providing a XOR result of 1. The right bits are both 0, providing a XOR result of 0 and setting y equal to 2 (010).

Example: v = 12 ^ 10

```
     12     1 1 0 0
XOR  10     1 0 1 0
      6     0 1 1 0
```

>> Shift right and << left operators

Shift right (>>) and shift left (<<) operators shift the operands binary representation a specified number of bits and returns the result in the operands original format. During shifts, emptied bit positions are filled with zeros. Shift operators use the twos complement representation for negative numbers.

Example: Q = 14>>1

14 (1110) shifts right 1 bit to become 7 (0111) and is loaded into variable Q.

Example:
```
VAR DIV4
m = 2
DIV4 = 75<<m
```

75 (1001011) shifts left 2 bits to become 300 (100101100) and is loaded into variable DIV4.

Example: X = -19<<3

-19 (11101101) shifts left 3 bits to become -152 (111101101000).

6-6-2 ORDER OF CALCULATION

When more than one operator is contained in an expression, the operators are calculated in the following order:

- Contents of parenthesis, calculating from inner sets to outer sets of parenthesis.
- Positive (+), negative (-), bitwise complement (~) and logical negation (!).
- Exponentiation (**).
- Multiplication (*), division (/) and modulus (%).
- Addition and subtraction.
- Shift left (<<) and right (>>) operations.
- Bitwise AND (&).
- Bitwise XOR (^).
- Bitwise OR (|).
- Logical AND.
- Logical OR.

Condition? *true:false*

6-7 MATHEMATICAL FUNCTIONS

TMAC provides mathematical functions to assist in mathematical calculations:

TRUE,ON

Produces 1.

Example: X=TRUE

X is set to 1.

FALSE,OFF

Produces 0.

Example: Y=OFF

Y is set to 0.

LOG(n)

Produces the base 10 logarithm of n.

Example:
```
VAR Log_C
C = 5
Log_C = LOG(C)
```

Log_C now holds base 10 logarithm of 5 (.69897).

NOTE: If n ® 0, LOG(n) command execution results in an error message as this function is not defined for these values.

LN(n)

Produces the natural logarithm (base e) of n.

Example:
```
VAR Nat_log
Nat_log = LN(D)
```

Nat_log now holds natural logarithm of 5 (1.609438).

NOTE: If n ® 0, LN(n) command execution results in an error message as this function is not defined for these values.

ABS(n)

Produces the absolute value of n.

Example:
```
Y=ABS(-4)
```

Y now equals +4.

Example:
```
Z=-7
POS=ABS(Z)
```

POS now holds +7.

FLOOR(n)

Produces the truncated value of n.

Example:
```
VAR Round_off
Round_off = FLOOR(5.99)
```

Round_off now holds 5 the truncated value of 5.99.

SQR(n)

Produces the positive square root of n.

Example:
```
VAR Square_Root
Square_Root = SQR(30)
```

Square_Root now holds the positive square root of 30 (5.477226).

NOTE: The square root function returns 0 for the square root of negative numbers.

EXP(n)

Produces e to the power of n.

Example:
```
VAR Expo
x=1.57
Expo=EXP(x)
```

Expo now holds e to 1.57th power (4.810255).

SIN(n)

Produces the sine of n measured in radians.

Example:
```
VAR Sine_of_radians
Sine_of_radians=SIN(3.1415/3)
```

Sine_of_radians now holds the sine of $\pi/3$ (0.86601).

COS(n)

Produces the cosine of n measured in radians.

Example:
```
VAR Cosine_of_radians
Cosine_of_radians=COS(5*3.1415/6)
```

Cosine_of_radians now holds the cosine of $5\pi/6$ (-0.8659868).

Produces -1 if n<0, 0 if n=0 or 1 if n>0.

Example: S=SIGN(-6)

Value of S is set to -1.

6-8 STRING VARIABLES AND FUNCTIONS

A string is a segment of text consisting of ASCII characters. String variables are declared using the **STRING** command. There is a free string variable, represented by the $ character that does not need to be declared. String variables are either local (declared inside a macro) and are used only inside that macro or are global (declared outside a macro) and are used outside or inside any macro, depending on scope.

A literal string (actual ASCII text segment) is enclosed in quotation marks or apostrophes. To signify a quotation mark inside a literal string enclosed with quotation marks, a pair of quotation marks are used. When quotation marks are used to signify a literal string, apostrophes are treated as normal characters. To signify an apostrophe inside a literal string enclosed in apostrophes, a pair of apostrophes are used. When apostrophes are used to signify a literal string, quotation marks are treated as normal characters.

String variable names start with a letter while the remaining characters can be letters, numbers and the underscore. String variable names can be 2 to 31 characters in length. The **STRING** command has the following form:

STRING *name, name,... , name*

String variables cannot be initialized when declared. Only literal strings and/or declared string variables can be assigned to the initialized string variable.

Example: STRING WARNING, Note1, Message_no_2
Note1 = "This is a string variable"

Strings and string variables are combined by using + character as follows:

Example: STRING Note_1, Note_2, Note_3
Note_1 = "A STRING"
Note_2 = "COMBINING"
Note_3 = Note_1 + " " + Note_2 + " EXAMPLE"

Note_3 now equals A STRING COMBINING EXAMPLE.

Segments are removed from strings using brackets in the following manner:

name1 = *name2*[*start*][*end*]

name1 is set equal to the segment in *name2* that begins with the *start* number and ends with the *end* number. Count of string *name2* begins with 0. String *name2* is not affected unless *name1* and *name2* are the same name.

Example: STRING Test
$ = "Test4"
Test = $[4][4]

Test contains the fourth (count begins with 0) character of string $.

Example: STRING MEMO1
MEMO1 = "Message example"
Memo1 = Memo1[10][15]+Memo1[0][3]

Memo1 now contains the string "ample mess".

String Arrays are also declared using the **STRING** command by including the highest index in brackets as shown:

STRING *name* [index]

The index count starts with 0, making *index* one less than the actual number of variables in the array. String arrays cannot be initialized when declared. Only one string array element is assigned a value at a time.

Example: STRING MESSAGE [5]

This command declares a string array named message containing six elements.

Example: MESSAGE [0] = "see"
MESSAGE [1] = "spot"
MESSAGE [2] = "run"

This example assigns values to the first three elements of string array MESSAGE.

Substringing on string arrays allows segment selection from one or more elements in a string array. Adding a *start* and *end* number selects the segment in the *element* of the declared and initialized string array (*arrayname*). Segments are selected using the following format:

arrayname[*element*][*start*][*end*]

Example: $ = MESSAGE [0] [1] [2]

This example assigns the string "ee" to $. ee is the segment in the first element [0], starting at character [1] and going through character [2].

There are several string functions that allow manipulations of strings:

CHR(n)

Returns the character equivalent of ASCII number n.

Example: $=CHR(82)

$ is set equal to R (ASCII number of R is 82).

TAB(n)

Returns a blank string of length n spaces.

Example: PRINT TAB(7),"FREQ = "

FREQ = is printed starting 7 spaces from left edge of the CRT.

ASC($)

Returns ASCII value of the first character of a string.

Example:
```
VAR Ascii_value
STRING Char
Char="Example"
Ascii_value = ASC(Char)
```

Ascii_value, a numeric variable, contains 67 (ASCII number of E).

LEN($)

Returns the length of string $ in the number of characters. The count in the string starts with 0.

Example:
```
Fred = "string"
B = LEN(Fred)
```

B, a numeric variable, contains 5 (the number of characters in "string").

STR(n)

Returns the string equivalent of number n.

Example: $ = STR(236)

$, a string variable, contains characters 236.

VAL($)

Returns the number equivalent of string $.

Example:
```
STRING Commd
Commd = "567"
C = VAL(Commd)
```

C, a numeric variable, contains the number 567.

PIXLEN($)

Returns the length of a string in pixels (useful in centering text).

Example:
```
STRING Mode                 // Declare Mode string.
Mode = "Test Mode 4"        // Initialize Mode string.
P = PIXLEN Mode             // Assign pixel length Mode to P.
XY ((640-P) /2) -1, 40      // Set point for horizontal center.
Print Mode                  // Print Mode string.
```

P, a numeric variable, contains the number 160, the length of "Test Mode 4" in pixels. (See **PRINT** and **XY** commands)

STRPOS ($1,$2)

Returns the position of string $2 inside string $1. If string $2 is not found, -1 is returned. The count in string $1 begins with 0.

Example:
```
STRING One, Two
One = "preset"
Two = "set"
X = STRPOS(One,Two)
```

X is set to 3, "set" starts with the fourth character in "preset".

6-9 MACROS

Macros are programs, groups of commands arranged to accomplish one or more tasks. Macros are written and transferred to the Test Set by a Host System (PC with terminal emulating software). Once the macro is transferred to the Test Set, it is stored in non-volatile memory until deleted by a ***PMC** or **FORGET** command. Once in memory, macros can be transferred to Flash Memory.

Macros are defined using the ***DMC** command (complying with IEEE-488.2) and have the form:

***DMC** "*name*", *command*,... , ,*command*

The name must start with a letter, the rest of the characters can be letters, numbers and the underscore. The maximum length is 31 characters (IEEE-488.2 allows only 12 characters).

Example: *DMC "Square",Y=X**2;PRINT "Y holds X squared"

Once the macro is loaded into memory, it is executed by entering the macro name. If the above macro is loaded, entering Square executes the macro Square. Macros can be called out and executed from other macros. However, a macro cannot be transferred into memory if it contains the name of an undefined macro, unless the name is in an **INTERP** command.

```
Example:  *DMC "Test_1",BEGIN
          Average
          END

Example:  *DMC "Test_2",BEGIN
          INTERP "Total"
          END
```

If the macro Average is not already defined, the macro Test_1 cannot be transferred into memory. Macro Test_2 can be loaded into memory because the string Total is not evaluated until execution of the **INTERP** command. The macro Total has to be defined prior to Test_2 execution, otherwise an execution error will occur.

Call nesting is the extended process of calling out other macros that call out other macros that call out other macros, etc. Call nesting uses a limited stack to contain all the internal variables and arrays for each macro called out. Reaching the stack limit initiates a memory error.

With TMAC as opposed to IEEE-488.2, macros are not limited to one line. Using the **BEGIN** and **END** commands lets the macro contain multiple lines, allowing large involved macros, while also providing clarity that one line macros cannot afford.

```
Example:  *DMC "Square_x",BEGIN
               Y=X**2
          END
```

A macro is deleted from memory using the **FORGET** command. All macros and variables declared after the deleted macro was declared are also deleted (because they may contain references to the deleted macro). The ***PMC** command deletes all macros and declared variables in memory regardless of location. Predefined macros are permanently in memory and are not affected by the ***PMC** or **FORGET** commands. The ***LMC?** query returns a list of the macros and defined variables contained in memory.

The address of a macro (location of macro in memory) is assigned to a variable by using an ampersand in the following manner:

X=&name

The **EXEC** command executes the macro at the address following the command. It has the form:

EXEC *address*

Example: ADD = &Square_x
EXEC ADD

The first command loads the address of Square_x into ADD. The **EXEC** command then executes Square_x.

The **EXEC** command can be used to call out undefined macros by simply declaring a variable and using the variable as the address.

The ***WAI** command pauses command execution until all previous operations are complete. ***WAI** is used following **SCREEN** commands and commands involving routing changes or long execution times. It has the form:

***WAI**

The size of the Test Set memory is the only limit to the number of macros that can be loaded. The **ROOM** command provides the available amount of memory space, in bytes.

Example: PRINT ROOM

Prints the number of available bytes left in memory on the CRT.

The **TAG** and **RETURNTO** commands behave in TMAC like setjump and longjump in C/C++. **TAG** defines a variable that when first used, will save the state of the unit so that when **RETURNTO** is called, the execution immediately jumps to the tag variable. In the following example, the "C" language equivalent of the TMAC macros are shown for comparison.

Example:

TMAC

```
tag brad

*dmc "m1",begin

   returnto brad (1)
end

*dmc "bb",begin

   if (brad)
    print "ALL DONE"
   else
    m1
   endif
end
```

C Equivalent

```
#include <setjmp.h>

jmp_buf brad;

void m1 (void)
{
   longjmp (brad,1);
}

void bb (void)
{
   if (setjmp(brad))
    printf("ALL DONE");
   else
    m1();

}
```

In the above example, when "bb" is called, the tag "brad" is checked and will by definition return a zero. Since "brad" returns 0, "m1" will get called. in "m1" the "returnto" statement gets executed which will restore the CPU state to execute where the brad tag was encountered. It also assigns brad the value "1" so the words "ALL DONE" get printed.

6-10 CONDITIONAL EXPRESSIONS

TMAC allows decision points to be placed inside a macro to allow different courses of action. For instance, if a condition is true, then one course of action is taken. If the condition is false, then another course of action is taken. See **CASE**, **IF**, **IF ELSE** and **IF ELIF**. All conditions have relational operators:

=	Equal
!=	Not equal
<	Less than
>	Greater than
<=	Less than or equal
>=	Greater than or equal

Example:
```
IF x=6
  PRINT y
ENDIF
```

Condition x equals 6 must be true for the next command (PRINT y) to execute; otherwise it is ignored and command execution passes to the command following the **ENDIF** command.

Example:
```
IF x!=z
  PRINT y
ENDIF
```

Condition x != z (x not equal to z) must be true for the next command to execute. If it is not true, the command following the **ENDIF** is executed next.

Conditions may also contain logical operators AND and OR. These operators connect two conditions. An expression with an OR is true if one or both conditions it connects are true. An expression with an AND is true if both conditions it connects are true. There can be many logical operators in a condition.

Example:
```
IF x=6 OR x!=z
  PRINT y
ENDIF
```

This condition is true if either x is equal to 6, if x is not equal to z or if both are true.

Example:
```
IF x=6 AND x!=z
  PRINT y
ENDIF
```

This condition is true if both x is equal to 6 and x is not equal to z.

Example:
```
IF W=3 OR U< 8 AND V=4
  PRINT y
ENDIF
```

This condition is true if either W is equal to 3 or both U is less than 8 and V is equal to 4.

Mathematical operators can be used in conditions.

Example: IF W> 2*X**3

The quantity 2*X**3 is calculated before compared to W.

Example: IF T = U&++V

In this example, V is incremented and bitwise AND is performed before comparison with T is done.

Mathematical functions can also be used in conditions.

Example: IF Y = SQR(COS(2*Freq))

In this example, the square root of the cosine of the quantity of 2 multiplied by Freq is calculated before the quantity is compared to Y.

Conditional expressions can be used without IF or other decision commands. Conditional expressions alone return a 1 if they are true and a 0 if they are false.

Example: X=W<2*y**2

If W is less than $2 \times y^2$, X is set to 1. If W is greater than $2 \times y^2$, X is set to 0.

Example: X=W=ABS(W)

If W is positive, W equals ABS(W) and X is set to 1. If W is negative, W does not equal ABS(W) and X is set to 0.

6-11 VARIABLES AND ARRAYS IN MACROS

Variables and arrays are passed to a macro when entering the macro by entering variables and arrays (parameters) after the name of the macro. Inside the macro, characters $1, $2, $3,...., $9 are place holders for the passed parameters. Parameters may be passed to macros during execution.

Example: ✱DMC "Compute",Y=$1✱✱$2;PRINT $1,"TO THE POWER OF ",$2," IS ",Y

Entering Compute 4,3 executes the macro Compute and sets $1 equal to 4 and $2 equal to 3. The CRT displays the result: 4 TO THE POWER OF 3 IS 64.

Example: VAR LIST[2]={1,3,5}

```
✱DMC "Average",BEGIN
 VAR SUM=0
FOR N=0 TO $1
SUM=SUM + $2[N]
NEXT N
PRINT "THE AVERAGE IS ",SUM/$1
END
Average 3, LIST
```

The macro Average reads an array and finds the average of the elements of the array. The length and name of the array is passed upon macro execution. When Average 3, LIST is entered, array LIST is passed using a **FOR** loop. The macro then prints the average of the 3 array values.

Example: Add=&Compute

EXEC Add,4,3

A comma is placed before the variables when a macro is executed using the EXEC command. This example executes the macro Compute and has the same result as the first example.

6-12 EDIT COMMANDS

TMAC allows editing via macro capability.

EDIT:FONT fontnum
Select the edit font. The font handles used by the host are 3, 4, and 5.

3 = Helvetica 12
4 = Helvetica 13
5 = Modified Helvetica 16 for EL Screen (COM-120B default)

OPTIONS:

Options are organized in a bit field as described below:

Display Options:

0	Default; no leading zeroes are displayed and the "+" sign is not displayed for positive numbers.
1	Display leading zeroes.
2	Display leading sign for both "+" and "-".

Justify Options:

4	Left Justify
8	Center Justify
16	Right Justify

Edit Options:

32	No edit Options (default). This is mutually exclusive with the rest of the edit options.
64	No editing allowed for this field.
128	No wrap-around for this edit field.
256	Blank the units string while editing.
512	No numeric characters to be entered while editing.
1024	Does not allow the decimal point character while editing.
2048	Limits the number of digits entered during and edit.

EDIT:STRing var, x, y, maxlen, type, max_x, bot_x, bot_y.
This is the main edit command to begin editing a string field.

Parameter Description:

var	string variable to edit
x	base x-coord for display string
y	base y-coord for display string
maxlen	maximum number of characters to allow
type	string entry/slew range

bot_x	x-coord of optional second row
bot_y	y-coord of optional second row

EDIT:VAR var, x, y, min, max, decimals, length, signif, options.
This is the main edit command to begin editing float value.

Parameter Description:

var	TMAC Variable to edit
x	Base x-coord
y	Base y-coord
min	minimum edit value
max	maximum edit value
decimals	number of digits after the decimal point
length	number of total digits in the field (this includes the decimal point and the "-" (minus) sign
signif	number of digits to display after the decimal point
options	optional for display, justify and edit. See above for explanation on options.

EDIT:MENU var, x1, y1, entries1, vspacing, x2, entries2, x3, entries3
This is the main edit command to begin editing a menu field.

Parameter Description:

var	Table to find data values
x1	Base of x-coord of first row/column
y1	Base of y-coord of first row/column
entries1	number of rows in first column
vspacing	y-offset to second row
x2	x-offset to second column
entries2	number of rows in second column
x3	x-offset to third column
entries3	number of rows in third column

EDIT:SELection var, x, y, table, min, max, options

Parameter Description:

var	Variable to edit
x	Base x-coord
y	Base y-coord
table	Variable containing the table of values selectable
min	index of first value in the table
max	index of last value in the table
options	optional for display, justify and edit. See above explanation on options

EDIT:DONE?
This returns whether or not the edit is closed.

0 = edit not closed
1 = closed by ENTER
-1 = closed by ESC

EDIT:END
This command closes an edit field and releases its resources. Only 1 field can be opened at a time.

EDIT:ISA:NUMber? key
This command determines if the key passed in is a number key (between 0 and 9, or "."). In this command, "key" is the value returned from the system:key? command.

1 = key is 0-9 or .
0 = otherwise

EDIT:ISA:MEMory? key
This command determines if the key passed in is a memory key (STORE, RECALL, SHOW LIST or SETUP). In this command, "key" is the value returned from the system:key? command.

1 = key is STORE, RECALL, SHOW LIST or SETUP
0 = otherwise

EDIT:ISA:MODE? key
This command determines if the key passed in is a mode key (REC, GEN, DUP or SPCL). In this command, "key" is the value returned from the system:key? command.

1 = key is REC, GEN, DUP, or SPCL
0 = otherwise

EDIT:ISA:INSTrument? key
This command determines if the key passed in is an instrument key (SCOPE, ANLYZ, MTRS or AUDIO GEN). In this command, "key" is the value returned from the system:key? command.

1 = key is SCOPE, ANLYZ, MTRS or AUDIO GEN
0 = otherwise

EDIT:ISA:HARDkey? key
This command determines if the key passed in is a hardkey (MODE, INST or MEM). In ths command, "key" is the value returned from the system:key? command.

1 = key is MODE, INST or MEM
0 = otherwise

EDIT:ISA:EDIT? key
This command determines if the key passed in is an edit key (0-9, ".", A-Z, EDIT UP, EDIT DOWN, EDIT LEFT, EDIT RIGHT or SPINNER). In this command, "key" is the value returned from the system:key? command.

1 = key is 0-9, ".", A-Z, EDIT UP, EDIT DOWN, EDIT LEFT, EDIT RIGHT or SPINNER
0 = otherwise

EDIT:ISA:DATAscroll? key
This command determines if the key passed in is a data scroll key (EDIT UP, EDIT DOWN, EDIT LEFT, EDIT RIGHT, SPINNER, CURSOR UP, CURSOR DOWN, CURSOR LEFT or CURSOR RIGHT). In this command, "key" is the value returned from the system:key? command.

1 = key is EDIT UP, EDIT DOWN, EDIT LEFT, EDIT RIGHT, SPINNER, CURSOR UP, CURSOR DOWN, CURSOR LEFT or CURSOR RIGHT
0 = otherwise

EDIT:ISA:SOFTkey? key
This command determines if the key passed in is a softkey (SFTK1-SFTK6). In this command, "key" is the value returned from the system:key? command.

1 = key is SFTK1-SFTK6
0 = otherwise

6-13 CREATING WINDOWS AND GRAPHICS

TMAC allows creation of new screen displays and changes to CRT screen configurations. Colors can be changed. Windows can be created and moved. Pixels, boxes, lines and figures may be drawn and placed anywhere on the CRT screen. Audio cues can be implemented.

6-13-1 CRT DISPLAY

The display subsystem divides the CRT screen into pixels: 540 in the horizontal direction and 400 in the vertical direction. Window and graphic commands use these pixels to determine screen location. Screen locations are specified using a coordinate system with point 0,0 located in the top left corner of the CRT screen. The positive horizontal component is to the right and the positive vertical component is in the downward direction.

SCREEN:SHOWPAGEpage
This command will cause the EL screen to display either video page 0 or 1.

SCREEN:DRAWPAGEpage
This command selects the video page where drawing will take place (where the video page is either 0 or 1).

SCREEN:HIRESolution?
This command returns the number of pixels in the horizontal direction.

SCREEN:VRESolution?
This command returns the number of pixels in the vertical direction.

6-13-2 COLORS

The following is a list of colors available for the COM-120B.

VALUE	INTENSITY LEVEL (%)
0	0
1	25
2	25
3	75
4	100
5	100
6	100
7	100

VALUE	INTENSITY LEVEL (%)
8	0
9	25
10	25
11	75
12	100
13	100
14	100
15	100

COLOR commands change the color selection for the CRT screen. All graphics will be displayed in the color selected unless it is specifically overridden in the graphics command. Refer to the graphics commands for more details.

COLOR*f* [,*b*]
Changes the foreground color to the color selected for *f (where f is one of the values listed above)*. Optionally, the background color can also be listed following the foreground color.

COLOR?
Returns the current foreground color.

BCOLOR*f*
Changes the background color to the color selected for *f (where f is one of the values listed above)*.

BCOLOR?
Returns the current background color.

6-13-3 WINDOWS

Windows, used primarily for menus, can be created and moved. There can be up to 1 window on a screen at one time. The main screen is considered window 0 and if a window is open in the main screen, it will be window 1. The **WSEL** command will switch between these two models. Windows can be any size or color and can be moved to any location on the screen. Following are the window commands:

CLS
Clears everything from entire display screen (window 0) or currently selected window except for active readings.

WOPEN *c*, *x1*, *y1*, *x2*, *y2*
Opens a *c* colored window. The top left corner is located at point *x1*, *y1* and the bottom right corner is located at point *x2*, *y2*.

WCLOSE 1
Closes the active window. Only one window can be open at a time.

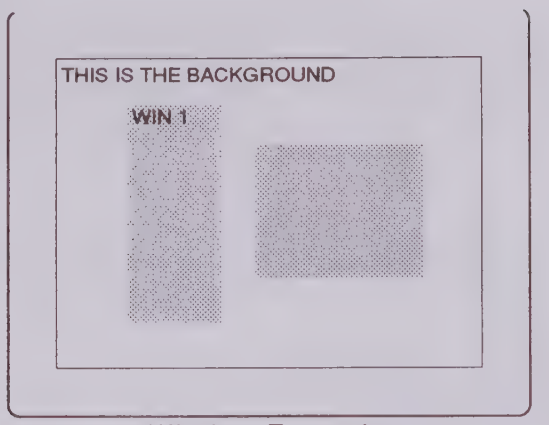
WSEL *n*
Makes window *n* the currently selected window. Selecting window 0 selects the background window. Selecting window 1 selects the opened window.

WINDOW?
Returns the number of the last opened window (useful when closing or selecting windows).

Print commands executed while a window is open prints inside the currently selected window. To print outside the windows, select window 0 (background screen).

Example:
```
CLS
WOPEN 10, 100,50,  250,300
WOPEN 12,  300,100,  550,250
WSEL 1
PRINT "WIN 1"
WSEL 0
PRINT "THIS IS THE BACKGROUND"
```

These commands produce the following display:



8618010

Window Example

6-13-4 SOFT FUNCTION KEY DISPLAYS

Soft Function Key definitions and the Soft Function Key frame at the bottom of the CRT screen are added using the following commands.

KEYPAD:SOFT
Creates a Soft Function Key frame at the bottom of the current screen displayed on the CRT.

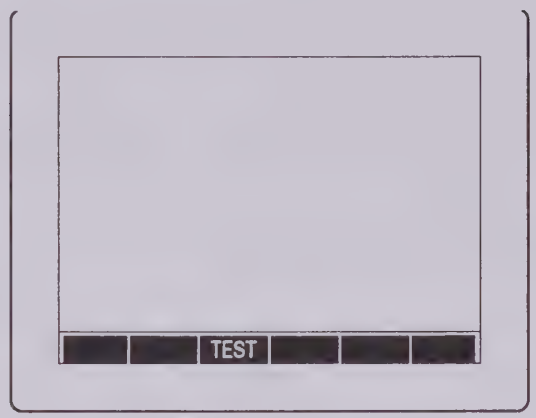
KEYPAD:LABel *n*,"*label*"
Changes the *label* of Soft Function Key *n* (1 to 6) on the current screen to the specified string.

NOTE: KEYPAD:LABel *n*, "" is equivalent to **KEYPAD:ERASE** *n*.

KEYPAD:ERASE *n*
Erases the label of Soft Function Key *n* (1 to 6) on the current screen.

```
Example:  CLS
          KEYPAD:SOFT
          KEYPAD:LAB 3," Test"
```

The following is shown on the Test Set CRT:



8618012

Soft Function Key Example

6-13-5 GRAPHICS AND TEXT

Graphics and text commands creates pixels, lines, boxes and user defined shapes for display on the CRT:

XY *n,m*
Places a point location into memory with *n* being the x position (0 to 559) and *m* being the y position (0 to 399). 0,0 is the upper left hand corner of the CRT. **PIXEL**, **PRINT** and **ICON** commands start at the current x,y position.

PIXEL
Displays a point on the CRT at the current x,y location. A point is displayed in the current foreground color and does not change color if the foreground color changes. The point does not move if a **XY** command changes the point location in memory.

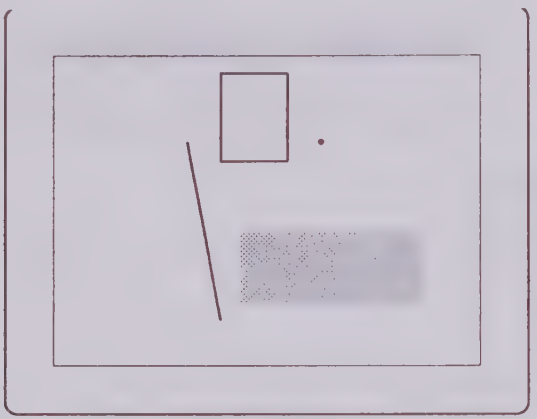
DRAW *x1, y1, x2, y2, c*
Draws a line from point *x1, y1* to point *x2, y2* in the color selected for *c*.

BOX *f, x1, y1, x2, y2, c*
Draws a box with the top left corner at point *x1, y1* and the bottom right corner at point *x2, y2*. Box is drawn in color selected for *c*. If *f* is set to 0, the box is empty. If *f* is set to 1, the box is created solid. If *f* is set to 2, a pattern fill is used.

Example:
```
XY 400,100
COLOR 1,0
PIXEL
DRAW 200,100 250,300, 12
BOX 0, 250,20 350,120, 10
BOX 1, 280,200, 550,280, 13
```

This set of commands creates the following graphics displayed in Figure 3-3.

- 25% intensity pixel at point 400,100 and 100% intensity line from point 200,100 to point 250,300.
- Hollow 25% intensity box with top left corner at point 280,200 and lower right corner at point 350,120.
- Solid 100% intensity box with top left corner at point 280,200 and lower right corner at point 550,280.



8618011

Graphics Examples

PRINT *%On1, expression, expression, ...,expression*
Displays information on the CRT, starting at the current xy position. An *expression* may be a variable (displayed as a value), string or characters and spaces designated within quotation marks. The *%On1* sets the format for numeric values (see **PRINT** command)

ELLIPSE *b, x, y, r, a, c*
Draws an ellipse centered at *x,y* with radius *r* and aspect ratio *a*. ellipse is drawn in color selected for *c*. If *b* is 1, the ellipse is solid. If *b* is 0, the ellipse is hollow. If *b* is 2, a pattern fill is used. An aspect ratio of 1 creates a circle. Parameters *x, y, r* and *a* are measured in pixels. The height and width of other ellipses are found using the following equations:

a < 1	Width = a x r	Height = r
a > 1	Width = r	Height = r/a

ICON *b,r,name*
Creates a user defined graphic displayed on the CRT. The CRT displays a predefined bit pattern with each bit represented by a pixel. Parameter *b* sets how many bits per row, *r* sets how many rows and *name* is a data array name which contains the preset bit pattern. The data array consists of 32 bit words. The graphics top left corner is the current XY position.

```
Example:  DATA bits={#hFFFFF3FF,#hFFCFFFFF,#hFFFFF3FF,#hFFCFFFFF,
                     #hFFFFF3FF,#hFFCFFFFF,#hFFFFF3FF,#hFFCFFFFF,
                     #h00F003C0,#h000F000F,#h00F003C0,#h000F000F,
                     #h00F003C0,#h000F000F,#h00F003C0,#h000F000F,
                     #h00F003FF,#hFC0FFFFF,#h00F003FF,#hFC0FFFFF,
                     #h00F003FF,#hFC0FFFFF,#h00F003FF,#hFC0FFFFF,
                     #h00F003C0,#h000F7E00,#h00F003C0,#h000F3F00,
                     #h00F003C0,#h000F0F80,#h00F003C0,#h000F07E0,
                     #hFFFFF3C0,#h000F01F8,#hFFFFF3C0,#h000F00FC,
                     #hFFFFF3C0,#h000F003E,#hFFFFF3C0,#h000F001F}
          XY 300,130
          ICON 64,20,bits
```

SCROLL *x, y, width, height, number, color*
This command scrolls a selected area of the screen defined by the beginning top left point (x,y), for a width of "width" and a height of "height". "number" is the number of pixels to scroll the area. A positive number will scroll the area up, and a negative number scrolls the screen down. Color is the color to leave the blank area left over after the scrolling is done.

SCREEN:SHOWPAGE *page*
This command selects which display page is displayed. The COM-120B draws items on Display page 0. Display page 1 is reserved for macro applications.

SCREEN:DRAWPAGE *page*
This command selects which page the RCI command draws on. Affects all RCI drawing commands.

SCREEN:PLOTPAGE *page*
This command selects which page the analyzer/scope trace is displayed on.

SCREEN:HRESolution?
This command returns the number of pixels in the x direction.

SCREEN:VRESolution?
This command returns the number of pixels in the y direction.

MOVE *from _x, from _y, width, height, to _x, to _y, from _page, to _page*
This command copies a block of a screen to another place, possibly overlapping, possibly another page.

PATTERN *pat_data*
This command defines a fill pattern for BOX, ELLIPSE and POLYFILL. Fill pattern is a DATA array of 16 values. A 1 bit turns on a pixel, a 0 bit turns a pixel off. (See, **ICON**)

POLYLINE *count,data*
This command draws a connected series of lines. Count is the number of points to draw. Data is an array of x/y values.

```
Example:  DATA pentagon={200, 0,
                         250, 50,
                         225, 100,
                         175, 100,
                         150, 50,
                         200, 0}
          POLYLINE 6, pentagon
```

POLYFILL *count,data*
This command draws a connected series of lines and fills the resulting shape. Count is the number of points to draw. Data is an array of x/y values.

```
Example:  DATA pentagon={200, 0,
                         250, 50,
                         225, 100,
                         175, 100,
                         150, 50,
                         200, 0}
          POLYFILL 6, pentagon
```

6-14 AUDIO TONES

Audio tones are generated using the **SOUND** command:

SOUND *f,t*
This command generates a tone of frequency *f* Hz for *t* ms. The tone is routed to the Test Set Speaker.

6-15 DELAY

Delay is used to delay command execution.

DELAY*t*
Delays provide a time delay before the next command is executed. Delays are used to allow physical changes enough time to occur before command execution continues. Such changes could be: code generation, routing changes and displaying Operation Screens.

t
The length of time delayed in ms.

```
Example:  SCREEN:GEN
          *WAI
          GEN:DCS:INV 311
          DELAY 2000
          GEN:DCS:STOP
```

The **DELAY** command delays for 2 seconds to allow time for the DCS Code generation

TPAUSE
This command passes command execution to the next macro any Test Set activity in the schedule queue.

6-16 SYSTEM RS-232 CONFIGURE COMMANDS

The following commands allow the Test Set to control another device using serial RS-232 communication. Commands unique to the device controlled are sent as strings. Responses are received as strings.

SYSTem:PTHRough:SERial *"string"*
Passes the *string* through the RS-232 Connector.

SYSTem:PTHRough:SERial?
Waits for and returns a string from the RS-232 Connector.

SYSTem:PTHRough:SERial:QUEue?
Returns a non-zero value if data is in the RS-232 queue, 0 if the RS-232 queue is empty.

SYSTem:PTHRough:SERial:KEY?
Waits for and returns one character from the RS-232 Connector.

6-17 SETUP COMMANDS

SETUP commands establish the routings for various Operation Modes without displaying the Operation Screens on the CRT. They will force the COM-120B to switch to page 1 (a blank screen) but will perform all the hardware setups.

SETUP:ANALyzer
Configures for independent Spectrum Analyzer.

SETUP:BER
Configures for the BER meter.

SETUP:DUPlex:GENerator
Configures for the Duplex Generator Operation.

SETUP:DUPlex:GENerator DISTortion
Configures for the Dependent Distortion Meter Operation.

SETUP:DUPlex:GENerator AFLevel
Configures for the AF Level Meter Operation.

SETUP:DUPlex:GENerator SINad
Configures for the Dependent SINAD Meter Operation.

SETUP:DUPlex:GENerator SCOPe
Configures for the Dependent Oscilloscope Operation.

SETUP:DUPlex:GENerator ANALyzer
Configures for the Dependent Spectrum Analyzer Operation.

SETUP:DUPlex:RECeiver
Configures for the Duplex Receiver Operation.

SETUP:DUPlex:RECeiver LEVel
Configures for the Dependent Received Level Meter.

SETUP:DUPlex:RECeiver MODulation
Configures for the Modulation Meter.

SETUP:DUPlex:RECeiver DISTortion
Configures for the Dependent Distortion Meter.

SETUP:DUPlex:RECeiver AFCounter
Configures for the Dependent AF Meter.

SETUP:DUPlex:RECeiver POWer
Configures for the Power Meter.

SETUP:DUPlex:RECeiver SINad
Configures for the Dependent SINAD Meter.

SETUP:DUPlex:RECeiver SCOPe
Configures for the Dependent Oscilloscope.

SETUP:DUPlex:RECeiver ANALyzer
Configures for the Dependent Spectrum Analyzer Operation.

SETUP:DUPlex:RFERror
Configures for the Frequency Error Meter.

SETUP:DUPlex:RECGen
Configures for the Duplex Operation.

SETUP:FGENerator
Configures for the Audio/Data/Signal Generators.

SETUP:GENerator
Configures for the Generator Operation.

SETUP:GENerator DISTortion
Configures for the Dependent Distortion Meter Operation.

SETUP:GENerator AFLevel
Configures for the AF Level Meter Operation.

SETUP:GENerator SINad
Configures for the Dependent SINAD Meter.

SETUP:GENerator SCOPe
Configures for the Dependent Oscilloscope Operation.

SETUP:GENerator ANALyzer
Configures for the Dependent Spectrum Analyzer Operation.

SETUP:METers DISTortion
Configures for the Independent Distortion Meter Operation.

SETUP:METers SINad
Configures for the Independent SINAD Meter Operation.

SETUP:METers AFCounter
Configures for the Independent AF Counter Meter.

SETUP:METers DVM
Configures for the Independent DVM.

SETUP:RECeiver
Configures for the Receiver Screen Operation.

SETUP:RECeiver LEVel
Configures for the Dependent Received Level Meter.

SETUP:RECeiver MODulation
Configures for the Modulation Meter.

SETUP:RECeiver DISTortion
Configures for the Dependent Distortion Meter Operation.

SETUP:RECeiver AFCounter
Configures for the Dependent AF Counter Meter.

SETUP:RECeiver POWer
Configures for the Power Meter.

SETUP:RECeiver SINad
Configures for the Dependent SINAD Meter.

SETUP:RECeiver SCOPe
Configures for the Dependent Oscilloscope.

SETUP:RECeiver ANALyzer
Configures for the Dependent Spectrum Analyzer Operation.

SETUP:RECeiver RFERror
Configures for the RF Error Meter.

SETUP:SCOPe
Configures for the Independent Oscilloscope Operation.

SETUP:SETup
Configures for the Setup Menu.

SETUP:TRUNKing RADIOSimulation
Configures for the LTR® Radio Simulator Operation

SETUP:TRUNKing REPeater
Configures for the LTR® Repeater Simulator Operation.

SETUP:TRUNKing AUXSetup
Configures for the LTR® Auxillary Setup Operation.

SETUP:FLIST
Configures for the Frequency List Operation.

SETUP:STFList
Configures for the Stored Frequency List Operation.

6-18 DISPLAY COMMANDS

DISPLAY commands establish the routings for various Operation Modes and display the Operation Screens on the CRT.

DISPLAY:ANALyzer
Displays independent Spectrum Analyzer.

DISPLAY:BER
Displays the BER meter.

DISPLAY:DUPlex:GENerator
Displays the Duplex Generator Operation.

DISPLAY:DUPlex:GENerator DISTortion
Displays the Dependent Distortion Meter Operation.

DISPLAY:DUPlex:GENerator AFLevel
Displays the AF Level Meter Operation.

DISPLAY:DUPlex:GENerator SINad
Displays the Dependent SINAD Meter Operation.

DISPLAY:DUPlex:GENerator SCOPe
Displays the Dependent Oscilloscope Operation.

DISPLAY:DUPlex:GENerator ANALyzer
Displays the Dependent Spectrum Analyzer Operation.

DISPLAY:DUPlex:RECeiver
Displays the Duplex Receiver Operation.

DISPLAY:DUPlex:RECeiver LEVel
Displays the Dependent Received Level Meter.

DISPLAY:DUPlex:RECeiver MODulation
Displays the Modulation Meter.

DISPLAY:DUPlex:RECeiver DISTortion
Displays the Dependent Distortion Meter.

DISPLAY:DUPlex:RECeiver AFCounter
Displays for the Dependent AF Meter.

DISPLAY:DUPlex:RECeiver POWer
Displays the Power Meter.

DISPLAY:DUPlex:RECeiver SINad
Displays the Dependent SINAD Meter.

DISPLAY:DUPlex:RECeiver SCOPe
Displays the Dependent Oscilloscope.

DISPLAY:DUPlex:RECeiver ANALyzer
Displays the Dependent Spectrum Analyzer Operation.

DISPLAY:DUPlex:RFERror
Displays the Frequency Error Meter.

DISPLAY:DUPlex:RECGen
Displays the Duplex Operation.

DISPLAY:FGENerator
Displays the Audio/Data/Signal Generators.

DISPLAY:GENerator
Displays the Generator Operation.

DISPLAY:GENerator DISTortion
Displays the Dependent Distortion Meter Operation.

DISPLAY:GENerator AFLevel
Displays the AF Level Meter Operation.

DISPLAY:GENerator SINad
Displays the Dependent SINAD Meter.

DISPLAY:GENerator SCOPe
Displays the Dependent Oscilloscope Operation.

DISPLAY:GENerator ANALyzer
Displays the Dependent Spectrum Analyzer Operation.

DISPLAY:METers DISTortion
Displays the Independent Distortion Meter Operation.

DISPLAY:METers SINad
Displays the Independent SINAD Meter Operation.

DISPLAY:METers AFCounter
Displays the Independent AF Counter Meter.

DISPLAY:METers DVM
Displays the Independent DVM.

DISPLAY:RECeiver
Displays the Receiver Screen Operation.

DISPLAY:RECeiver LEVel
Displays the Dependent Received Level Meter.

DISPLAY:RECeiver MODulation
Displays the Modulation Meter.

DISPLAY:RECeiver DISTortion
Displays for the Dependent Distortion Meter Operation.

DISPLAY:RECeiver AFCounter
Displays the Dependent AF Counter Meter.

DISPLAY:RECeiver POWer
Displays the Power Meter.

DISPLAY:RECeiver SINad
Displays the Dependent SINAD Meter.

DISPLAY:RECeiver SCOPe
Displays the Dependent Oscilloscope.

DISPLAY:RECeiver ANALyzer
Displays the Dependent Spectrum Analyzer Operation.

DISPLAY:RECeiver RFERror
Displays the RF Error Meter.

DISPLAY:SCOPe
Displays the Independent Oscilloscope Operation.

DISPLAY:SETup
Displays the Setup Menu.

DISPLAY:TRUNKing RADIOSimulation
Displays the LTR® Radio Simulator Operation

DISPLAY:TRUNKing REPeater
Displays the LTR® Repeater Simulator Operation.

DISPLAY:TRUNKing AUXSetup
Displays the LTR® Auxillary Setup Operation.

DISPLAY:FLIST
Displays the Frequency List Operation.

DISPLAY:STFList
Displays the Stored Frequency List Operation.

DISPLAY:FLIST
Displays the Frequency List Screen.

DISPLAY:STFList
Displays the Stored Frequency List Operation Screen.

SECTION 7 - OPTIONS

7-1 INTERNAL BATTERY (OPTION 01)

Provides self-contained dc power when external ac or dc power is unavailable.

7-2 OVEN CRYSTAL OSCILLATOR FREQUENCY STANDARD (OPTION 02)

OCXO replaces the standard TCXO as system time base. Provides 0.01 x 10^{-6} accuracy.

7-3 30 kHz IF FILTER (OPTION 03)

Provides additional band limiting between 15 kHz and 300 kHz offered in standard set. Required for AMPS Mobile Station Test (Option 15).

7-4 VARIABLE AUDIO GENERATOR 2 (OPTION 04)

Replaces standard fixed 1 kHz Audio Generator with variable frequency Audio Generator. Optional Audio Generator has frequency range of 5 to 20000 Hz with sine wave shape and 5 to 10000 Hz with ramp, triangle and square wave shapes.

Optional Audio Generator 2 is available for use on the RF Generate, Duplex and Duplex Generate Operation Screens as a modulation source. Additionally, it is available for baseband output from the Audio/Data/ Signalling Generators Operation Screen.

7-5 GENERATE AMPLIFIER (OPTION 05)

The Generate Amplifier is an internal RF Amplifier providing 26 dB gain for AUX RF OUT Connector. With Option 05 installed, RF AUX OUT Connector output range is -130 to +13 dBm for all Operation Modes.

7-6 DATA GENERATOR/BIT ERROR RATE (BER) METER (OPTION 07)

7-6-1 BER METER DESCRIPTION

The BER Meter is accessed by first pressing SPCL TEST MODE Key and selecting the Bit Error Rate Test. The BER Meter is designed to be used in Baseband, RF Generate, RF Receive or Duplex Mode. The BER Meter is described in several sections due to complexity.

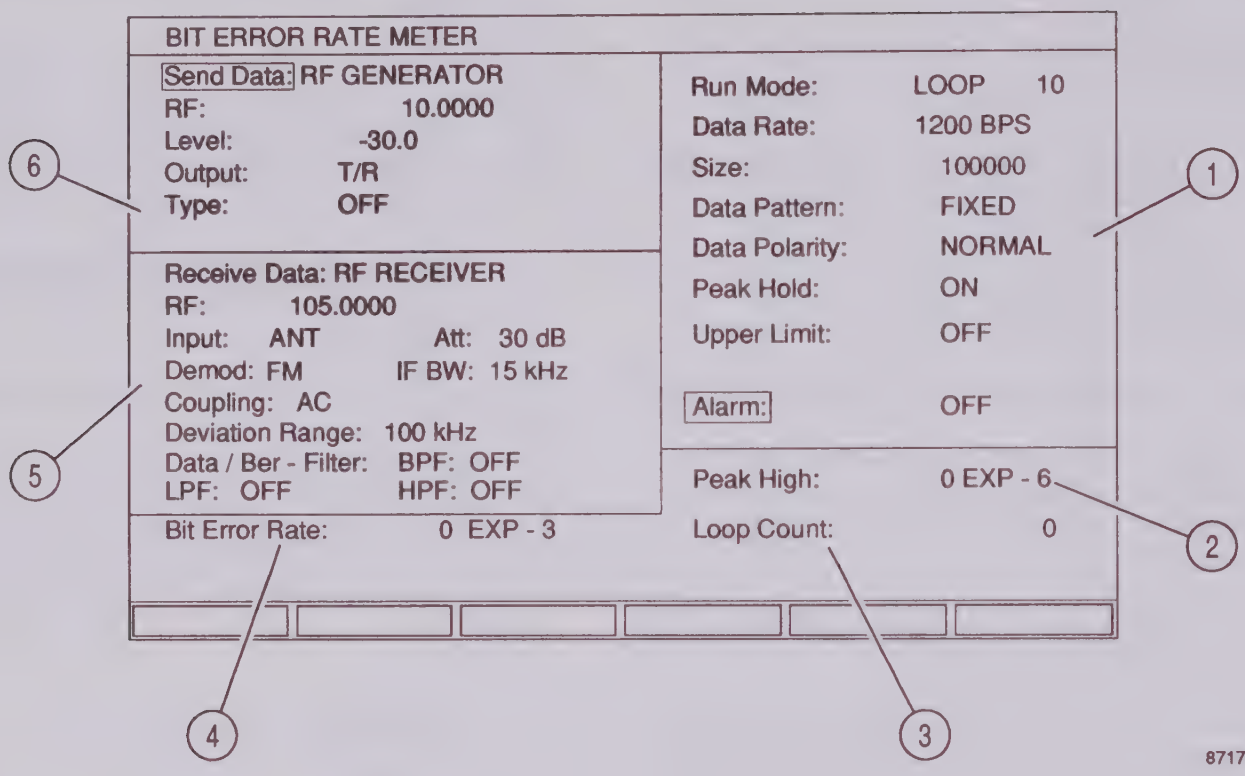
BER Meter General Operation Screen

BER Meter Configuration Section

Receive Data Configuration Section

Send Data Configuration Section

A. BER METER GENERAL OPERATION SCREEN



1. BER Meter Configuration Section

   Contains configuration data for signal.

2. Peak Reading

   Displays highest Bit Error Rate for current test.

3. Loop Count

   Displays number of times Data has been sent.

4. Bit Error Rate

   Displays Bit Error Rate. Exponent changes depending on Data Pattern Size (10).

5. Receive Data Configuration Section

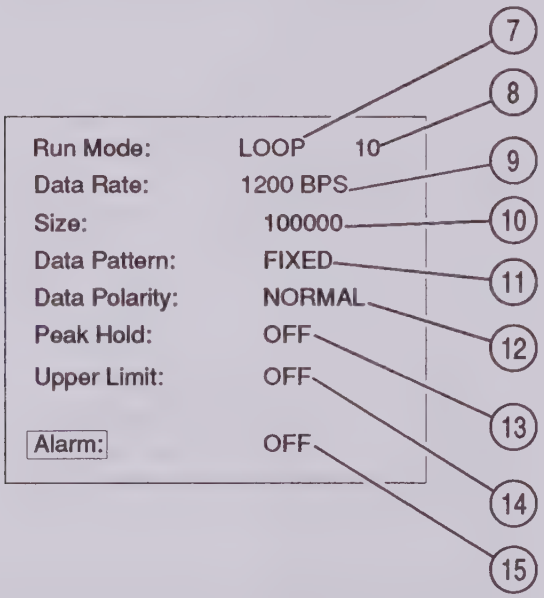
   Contains configuration data for Receive.

6. Send Data Configuration Section

   Contains configuration data for Generate Section.

B. BER METER CONFIGURATION SECTION

This section contains the parameters for setting the message size, rate and pattern as well as information on configuring the BER Meter. Functions and parameters for the BER Meter Configuration Section are as follows:



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7. Run Mode

Displays selected Operation Mode. Selections include Continuous (CONTIN.) and LOOP. When LOOP Mode is selected, LOOP Number (8) is displayed.

Soft Function Keys available with this function include

F1 CONTIN
Selects Continuous Run Mode.

F2 LOOP
Selects LOOp Run Mode.

F6 RETURN
Returns Operation to Special Test Menu.

8. LOOP Number

Displays selected number of Data Patterns to be Generated. Displayed only with LOOP selected for Run Mode (7). Range is 1 to 100000.

9. Data Rate

Displays selected Data Rate in Bits Per Second (BPS). Selections include:

75 BPS	150 BPS	300 BPS
600 BPS	1200 BPS	2400 BPS
4800 BPS	9600 BPS	

Soft Function Keys available with this function include:

F1 MENU
Accesses menu for selecting Data Rate.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

10. Data Pattern Size

Displays selected Data Pattern Size. Selections range from 128 to 100000 bits.

11. Data Pattern Type

Displays selected Data Pattern Type. Selections are RANDOM and FIXED. FIXED is an 8 bit hexadecimal pattern that is repeated. RANDOM is based on a pseudorandom seed.

Soft Function Keys available with this function include:

F1 RANDOM
Selects RANDOM Data Pattern Type.

F2 FIXED
Selects FIXED Data Pattern Type.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

12. Data Polarity

Displays selected Data Polarity Type. Displays NORMAL or INVERTED. INVERTED is the opposite code of NORMAL.

Soft Function Keys available with this function include:

F1 NORMAL
Selects NORMAL Data Polarity.

F2 INVERTED
Selects INVERTED Data Polarity.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

Operation Mode. Selections include Continuous (CONTIN.) and LOOP. When LOOP Mode is selected, LOOP Number (2) is displayed.

13. Peak Hold

Displays selected Peak Hold Function Status. Status is OFF or ON. When ON, Peak Reading (2) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

14. Upper Limit

Displays selected Upper Limit. Status is OFF or ON. When ON Upper Limit Value is displayed. Range of Upper Limit Value is 0 x 10^{-6} to 999 x 10^{-3}.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

15. Alarm

Displays Alarm status. Status is OFF or ON. Alarm sounds when Upper Limit (14) is exceeded.

Soft Function Keys available with this function include:

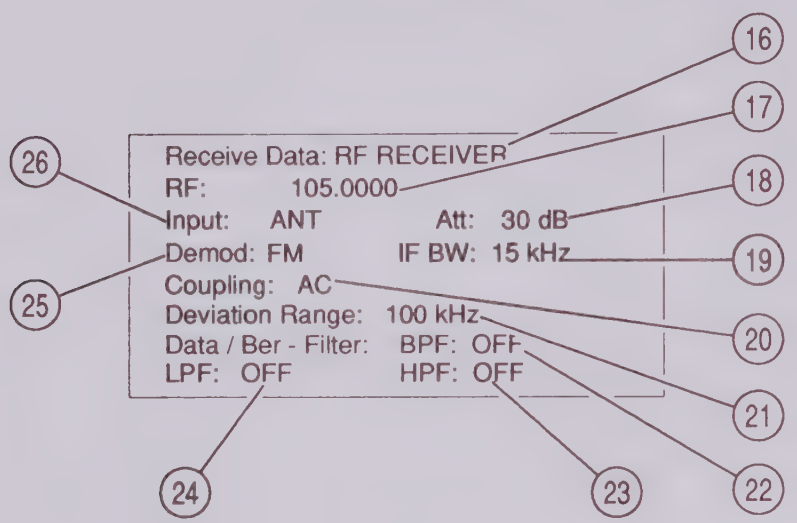
F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

C. RECEIVE DATA CONFIGURATION SECTION

This section contains the parameters for setting the Receiver Portion of the BER Meter. Functions and parameters for the Receiver portion of the BER Meter are as follows:



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16. Receive Data Input

Displays selected Input for BER Meter. Selections include RF RECEIVER and AUDIO DATA IN. Selecting RF RECEIVER means an RF Carrier is demodulated to receive the Data Signal. Selecting AUDIO DATA IN means Data Signal is received directly through the AUDIO/DATA IN Connector.

Soft Function Keys available with this function include:

F1 RF REC
Selects RF RECEIVER (either T/R or ANT ports) as BER Meter Input.

F2 DATA IN
Selects AUDIO DATA IN as BER Meter Input.

F6 RETURN
Returns Operation to Special Test Menu.

The following items are displayed only when RF RECEIVER is selected as Receive Data Input (16):

17. RF Field

Displays RF Receive Frequency. Selections range from .0000 to 1000 MHz.

18. Attenuation

Displays Input Attenuation. Selections are 0 or 30 dB.

Soft Function Keys available with this function include:

F1 30 dB
Selects 30 dB Input Attenuation.

F2 0 dB
Selects 0 dB Input Attenuation.

19. IF Bandwidth

Displays IF Filter Bandwidth. Selections are 300 and 15 kHz.

Soft Function Keys available with this function include:

F1 300 kHz
Selects 300 kHz IF Filter.

F2 15 kHz
Selects 15 kHz IF Filter.

20. Coupling

Displays Coupling Type for RF Receiver. Displayed only with FM selected for Demod Type (25). Selections are AC or DC.

Soft Function Keys available with this function include:

F1 AC
Selects AC Coupling.

F2 DC
Selects DC Coupling.

F5 FM-Z
Zeroes the FM Deviation Meter for proper readings.

F6 RETURN
Returns Operation to Special Test Menu.

21. Deviation Range

Displays FM Deviation Range. Displayed only with FM selected for Demod Type (25). Selections are 10, 20, 50 and 100 kHz.

Soft Function Keys available with this function include:

F1 10 kHz
Selects 10 kHz Deviation Range.

F2 20 kHz
Selects 20 kHz Deviation Range.

F3 50 kHz
Selects 50 kHz Deviation Range.

F4 100 kHz
Selects 100 kHz Deviation Range.

F6 RETURN
Returns Operation to Special Test Menu.

22. Bandpass Filter

Displays Bandpass Filter setting for demodulated signal. Selections include OFF and C-MSG (C-Message Weighted Filter).

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF.

F2 C-MSG
Activates C-Message Weighted Bandpass Filter.

23. High-Pass Filter

Displays current High-Pass Filter setting for demodulated signal. Selections include OFF, 300 Hz and 4 kHz.

High Pass Filter/Low Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF.

F2 300 Hz
Activates 300 Hz High-Pass Filter.

F3 4 kHz
Activates 4 kHz High-Pass Filter.

24. Low-Pass Filter

Displays current Low-Pass Filter setting for demodulated signal. Selections include OFF, 300 Hz, 4 kHz and 20 kHz.

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF.

F2 300 Hz
Activates 300 Hz Low-Pass Filter.

F3 4 kHz
Activates 4 kHz Low-Pass Filter.

F4 20 kHz
Activates 20 kHz Low-Pass Filter

25. Demod Type

Displays Demodulation Type. Selections include FM, AM and PM. Selection of FM activates Coupling (20) and Deviation Range (21) Fields.

Soft Function Keys available with this function include:

F1 FM
Selects FM as Demodulation Type.

F2 AM
Selects AM as Demodulation Type.

F3 PM
Selects PM as Demodulation Type.

26. Input

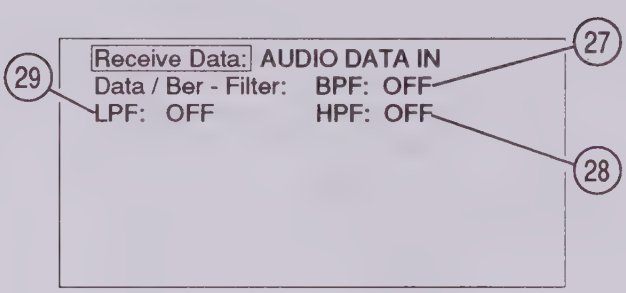
Displays signal Input Connector. Selections include T/R (T/R Connector) and ANT (ANTENNA Connector).

Soft Function Keys available with this function include:

F1 T/R
Selects T/R Connector as Input Connector.

F2 ANT
Selects ANTENNA Connector as Input Connector.

The following items are displayed only when AUDIO DATA IN is selected as Receive Data Input (16):



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27. Bandpass Filter

Displays current Bandpass Filter setting for signal passed through AUDIO/DATA IN Connector. Selections include OFF and C-MSG (C-Message Weighted Filter).

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF.

F2 C-MSG
Activates C-Message Weighted Bandpass Filter.

28. High-Pass Filter

Displays current High-Pass Filter setting for signal passed through AUDIO/DATA IN Connector. Selections include OFF, 300 Hz and 4 kHz.

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF.

F2 300 Hz
Activates 300 Hz High-Pass Filter.

F3 4 kHz
Activates 4 kHz High-Pass Filter.

29. Low-Pass Filter

Displays current Low-Pass Filter setting for signal passed through AUDIO/DATA IN Connector. Selections include OFF, 300 Hz, 4 kHz and 20 kHz.

High Pass Filter/Low Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF.

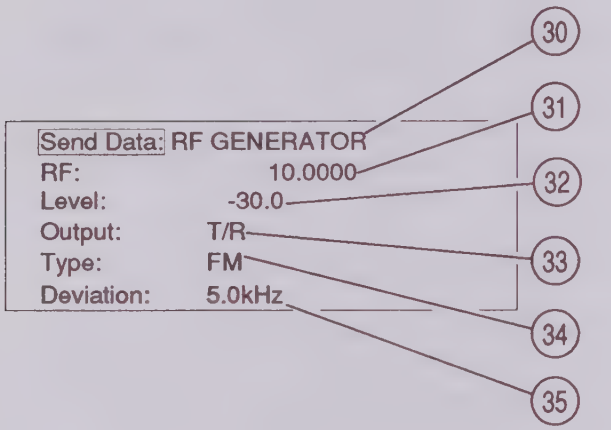
F2 300 Hz
Activates 300 Hz Low-Pass Filter.

F3 4 kHz
Activates 4 kHz Low-Pass Filter.

F4 20 kHz
Activates 20 kHz Low-Pass Filter

D. SEND DATA CONFIGURATION SECTION

This section contains the parameters for setting the Transmitter Portion of the BER Meter. Functions and parameters for the Transmitter portion of the BER Meter are as follows:



30. Send Data Output

Displays selected Output for BER Meter. Selections include RF GENERATOR and AUD/DATA GEN OUT. Selecting RF GENERATOR means an RF Carrier is modulated with the Data Signal before transmission. Selecting AUD/DATA GEN OUT means Data Signal is transmitted directly through the AUDIO/DATA GEN Connector.

Soft Function Keys available with this function include:

F1 RF GEN
Selects RF Generator as BER Meter source.

F2 DATA GEN
Selects Data Signal output through AUDIO/DATA GEN Connector.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

The following items are displayed only when RF GENERATOR is selected as Send Data Output (30):

31. RF Field

Displays RF Generator Frequency. Selections range from .0000 to 1000 MHz.

32. Level

Displays RF Generator output Level. Selections range from -130 to -30 dBm with T/R Connector selected as Output (33). Selections range from -130 to -13 dBm with AUX RF OUT Connector selected as Output (33).

33. Output

Displays Output Connector. Selections include AUX (AUX RF OUT Connector) and T/R (T/R Connector).

Soft Function Keys available with this function include:

F1 T/R
Selects T/R Connector for Output.

F2 AUX
Selects AUX RF OUT Connector for Output.

34. Modulation Type

Displays Modulation Type. Selections include OFF, AM, FM and PM.

Soft Function Keys available with this function include:

F1 OFF
Set Modulation Source to OFF.

F2 AM
Selects AM for Modulation Type.

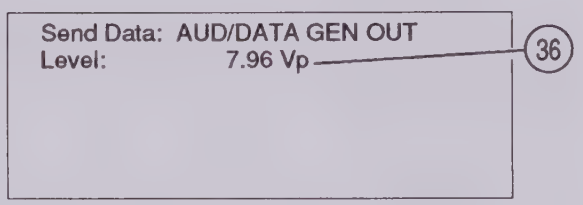
F3 FM
Selects AM for Modulation Type.

F4 PM
Selects AM for Modulation Type.

35. Modulation/Deviation Level

Displays Modulation Level. Selections range from 0.0% to 100% for AM Modulation Type (34), 0.00 to 100 kHz for FM Modulation Type (34) and 0.00 to 10 Rad for PM Modulation Type.

The following items are displayed only when AUD/DATA GEN OUT is selected as Send Data Output (30):



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36. Output Level

Displays Output Level of Data Signal. Selections range from 0.0 to 2.5 Vp in x1 (times 1) Mode or 0 to 25 mVp in /10 (divide by 10) Mode.

F1 x1
Selects x1 Output Mode.

F2 /10
Selects /10 Output Mode.

7-7 SINGLE SIDEBAND RECEIVE FILTER (OPTION 08)

7-7-1 GENERAL

Installation of the Single Sideband Receive IF Filter provides the ability to monitor SSB signals. When Filter is installed, 3 kHz Selection is available for IF Bandwidth Filter. Additionally, a 3 kHz Soft Function Keys is defined.

The Single Sideband and 30 kHz IF Filters are mutually exclusive. Only one additional IF Filter can be installed.

7-7-2 DESCRIPTION OF RECEIVE FUNCTION

RF Receive Operation is changed as follows:

- Analyzer Center Frequency is offset from center graticule ±1800 Hz, depending on whether Upper Sideband (UB) or Lower Sideband (LB) is selected as Demodulation Type.
- No Modulation Meter is provided for Single Sideband. Either Modulation Reading or Modulation Meter, whichever was last selected, is blanked from the screen.
- RF Error Meter is not provided for Single Sideband. RF Error Meter is blanked from the screen.

Additions and Redefinitions of parameters on the RF Receiver Operation Screen are as follows:

1. Demodulation Type

Includes two additional settings: UB (Upper Sideband) and LB (Lower Sideband).

Soft Function Keys available with this function include:

F4 LB
Selects Lower Sideband Demodulation.

F5 UB
Selects Upper Sideband Demodulation.

2. IF Bandwidth

Includes additional 3 kHz setting.

Soft Function Keys available with this function include:

F3 3 kHz
Selects 3 kHz Optional IF Bandwidth Filter. Renamed depending on Demodulation Type (1).

3. BFO Frequency

Tone/Data Code Field is renamed when UB or LB is selected as Demodulation Type (1). Displays selected adjustment for BFO Frequency. Adjustment range is ±4.0 kHz. No Soft Function Keys are defined when BFO Frequency is displayed.

4. AGC Setting

Displays current AGC Setting, AUTO or MANUAL. AUTO provides automatic gain control while MANUAL sets feedback level for automatic gain control to defined level. Selection of MANUAL accesses Feedback Level Data Field. Range is 0 to 1023.

7-8 RCC SIGNALING FORMATS (OPTION 09)

Activates encode capabilities for 10 PS, 20 PS, MTS, IMTS and Tone Remote Control Signaling Formats. These formats appear as selections for GEN1 RF Generate Modulation Source, GEN1 Duplex Generate Modulation Source and Audio Function Generator 1. While these selections appear whether or not Option 9 is installed, they are not active. Accessing these selections is discussed in Section 3-3, Operation Screens and Menus.

7-9 AUDIO/DIGITAL SIGNALING FORMATS (OPTION 11)

Provides encode/decode capabilities for both analog and digital signaling formats. Analog formats supported by Option 11 include:

CCIR	CCIRH	CCIRH4
EEA	EIA	NATEL
ZVEI	DZVEI	DDZVEI
EURO	5/6 Tone	

Listed below are the Frequencies and duration for each of the Audio Signaling Formats:

Tone Number	Code Digit	CCIR	CCIRH	CCIRH4	EEA	EIA	NATEL	ZVEI	DZVEI	DDZVEI	EURO	5/6 Tone
Tone 0	0	1981	1981	1981	1981	600	1633	2400	2200	2400	979.8	600
Tone 1	1	1124	1124	1124	1124	741	631	1060	970	1060	903.1	741
Tone 2	2	1197	1197	1197	1197	882	697	1160	1060	1160	832.5	882
Tone 3	3	1275	1275	1275	1275	1023	770	1270	1160	1270	767.4	1023
Tone 4	4	1358	1358	1358	1358	1164	852	1400	1270	1400	707.4	1164
Tone 5	5	1446	1446	1446	1446	1305	941	1530	1400	1530	652.0	1305
Tone 6	6	1540	1540	1540	1540	1446	1040	1670	1530	1670	601.0	1446
Tone 7	7	1640	1640	1640	1640	1587	1209	1830	1670	1830	554.0	1587
Tone 8	8	1747	1747	1747	1747	1728	1336	2000	1830	2000	510.7	1728
Tone 9	9	1860	1860	1860	1860	1869	1477	2200	2000	2200	470.8	1869
Repeat Tone	R	2110	2110	2110	2110	459	1805	2600	2400	970	1062.9	459
Group Tone	G	2400	2400	2400	1055	2010	1995	2800	885	885		2010
Alarm Tone	A				2400							
Tone Width (ms)		100	20	40	40	33	70	70	70	70	100	33/52

Digital formats supported by Option 11 include:

POCSAG
POCSAG/ (POCSAG INVERTED)

Encoding of the analog formats is available in RF Generate, Duplex Generate and Audio/Data/Signaling Generators Operation Screens. In the RF Generate and Duplex Generate Operation Screens, these formats are accessed by selecting GEN1 (Audio Generator 1) as a modulation source. In the Audio/Data/Signaling Generators Operation Screen, these formats are accessed through Audio Generator 1. Refer to Section 3-3, Operation Screens and Menus for information on selecting these formats.

Decoding of the analog formats is available in RF Receive and Duplex Receive Operation Screens. Select the desired signaling format for decoding at the Tone/Data Code Field. Refer to Section 3-3, Operation Screens and Menus for information on selecting these formats.

For information on Digital Signaling Formats refer to the following paragraphs:

7-9-1 Modulating RF Signals With Digital Signaling Formats

7-9-2 Encoding Digital Signaling Formats fo Audio Signal

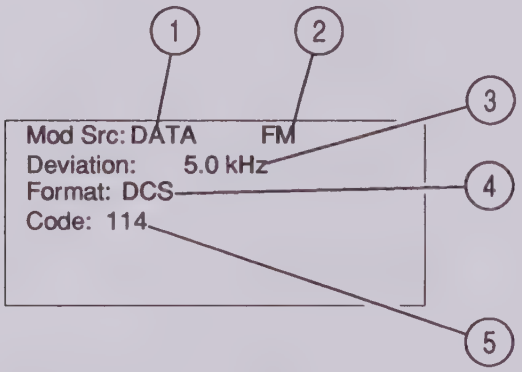
7-9-3 Decoding Digital Signaling Formats

7-9-4 Testing A Receiver using Digital Signaling Formats

7-9-5 Testing A Transmitter using Digital Signaling Formats

7-9-1 MODULATING RF SIGNALS WITH DIGITAL SIGNALING FORMATS

Digital Signaling Formats can be used as a modulation source in both RF Generate and Duplex Generate Operation. With Option 11 installed, optional Digital Signaling Formats are accessed by selecting the DATA Generator as the Modulation Source. Additional Formats available with this option include POCSAG and POCSAG Inverted (POCSAG/). DATA Modulation Source Block is defined as follows:



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1. Modulation Source

Displays selected Modulation Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator), DATA (DATA Generator), EXT (External Modulation) and MIC (Microphone Modulation).

Soft Function Keys available with this function include:

F1 GEN1
Accesses Audio Generator 1 parameters.

F2 GEN2
Accesses Audio Generator 2 parameters.

F3 DATA
Accesses DATA Generator parameters.

F4 DTMF
Accesses DTMF Generator parameters.

F5 MIC
Accesses MIC Modulation parameters.

F6 EXT
Accesses External Modulation parameters.

2. Modulation Type

Displays selected Modulation Type. Selections include OFF, AM, FM and PM.

Soft Function Keys available with this function include:

F1 OFF
Turns Modulation Source (1) OFF.

F2 AM
Selects AM as Modulation Type for Modulation Source (1).

F3 FM
Selects FM as Modulation Type for Modulation Source (1).

F4 PM
Selects PM as Modulation Type for Modulation Source (1).

3. Deviation/Modulation Level

Displays selected Deviation in kHz if current Modulation Type (2) is FM with range from 0.0 to 100 kHz. Displays selected Percent Modulation if current Modulation Type (2) is AM with range from 0% to 100%. Displays selected Deviation in radians if current Modulation Type (2) is PM with range from 0 to 10 Radians. Field is not displayed if Modulation Type (2) is OFF.

4. Format

Displays Format type for Modulation Source (1). Selections available with DATA include DCS, DCS/ (DCS Inverted), POCSAG and POCSAG/ (POCSAG Inverted).

Soft Function Keys available with this function include:

F1 MENU
Accesses menu for selecting Format.

Soft Function Keys available with POCSAG or POCSAG/ selected include:

F4 CONFIG
Accesses Configure screen for selecting POCSAG Function, Capcode Range and Data Rate. Capcode Range values are 1 to 9999999. Start and Stop Capcode are selected. Once activated, the system generates Start Capcode message. Capcode is increased by one and message resent until Stop Capcode message is generated. Data Rates are 512, 1200 and 2400 bps. POCSAG Functions include:

Function	Description
1 BEEP	Causes pager to beep 1 time.
2 BEEP	Causes pager to beep 2 times.
3 BEEP	Causes pager to beep 3 times.
4 BEEP	Causes pager to beep 4 times.
ALPHA_NUM	Transmits 0123456789.
ALPHA_NUM UC	Transmits ABCDEFGHIJKLMN OPQRSTUVWXYZ.
ALPHA_NUM LC	Transmits abcdefghijklmnopqrs tuvwxyz.
ALPHA_NUM SPEC	Transmits !"#$%&'()*+,-./:;<=> ?
NUMERIC	Transmits 0123456789-][
NUMERIC SEQ	Transmits following messages in sequence: 00000, 11111, 22222, 33333, 44444, 55555, 66666 and 77777.

Soft Function Keys available with this function include:

F1 512
Selects 512 bps Data Rate. Displayed only with cursor at Data Rate Field.

F2 1200
Selects 1200 bps Data Rate. Displayed only with cursor at Data Rate Field.

F3 2400
Selects 2400 bps Data Rate. Displayed only with cursor at Data Rate Field.

F6 RETURN
Returns unit to normal RF Generator Operation.

F6 BURST
Activates POCSAG data for one sequence.

5. Code

Displays selected code for DATA Modulation Source. Not displayed with POCSAG or POCSAG/ selected as Format (4).

7-9-2 ENCODING DIGITAL SIGNALING FORMATS FOR AUDIO SIGNAL

With Option 11 installed, the DATA Generator in the Audio/Data/Signaling Generators Operation Screen has POCSAG and POCSAG INV (Inverted) Formats in addition to the DCS and DCS INV (Inverted) Formats contained in the standard set. Output for the DATA Generator is through the AUDIO/DATA GEN Connector. Editing the DATA Generator can be performed from the Audio/Data/Signaling Operation Screen, from the RF Receive Operation Screen, or from the Duplex Receive Operation Screen.

Functions and parameters for the DATA Generator with Option 11 installed are as follows:

1. DATA Generator Prompt

   Activates selected Generator Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator) and DATA (DATA Generator).

   Soft Function Keys available with this function include:

   F1 GEN1
   Toggles Audio Generator 1 ON and OFF.

   F2 GEN2
   Toggles Audio Generator 2 ON and OFF.

   F3 DATA
   Toggles DATA Generator ON and OFF.

   F4 DTMF
   Toggles DTMF Generator ON and OFF.

2. Format

Displays Format type for DATA Generator. Selections include DCS, DCS INV, POCSAG and POCSAG INV.

Soft Function Keys available with this function include:

F1 DCS
Selects DCS as Format type. Activates CODE Field.

F2 DCS/
Selects Inverted DCS as Format type. Activates CODE Field.

F3 POCSAG
Selects POCSAG as Format type.

F4 POCSAG/
Selects Inverted POCSAG as Format type.

Soft Function Keys available with POCSAG or POCSAG/ selected as Format include:

F5 CONFIG
Accesses Configure screen for selecting POCSAG Function, Capcode Range and Data Rate. Capcode Range available is 1 to 9999999. Start and Stop Capcode are selected. Once activated, the system generates Start Capcode message. Capcode is increased by one and message resent until Stop Capcode message is generated. Data Rates available are 512, 1200 and 2400 bps. POCSAG Functions include:

Function	Description
1 BEEP	Causes pager to beep 1 time.
2 BEEP	Causes pager to beep 2 times.
3 BEEP	Causes pager to beep 3 times.
4 BEEP	Causes pager to beep 4 times.
ALPHA_NUM	Transmits 0123456789.
ALPHA_NUM UC	Transmits ABCDEFGHIJKLMN OPQRSTUVWXYZ.
ALPHA_NUM LC	Transmits abcdefghijklmnopqrs tuvwxyz.
ALPHA_NUM SPEC	Transmits !"#$%&'()*+,-./:;<=> ?
NUMERIC	Transmits 0123456789-][
NUMERIC SEQ	Transmits the following messages in sequence: 00000, 11111, 22222, 33333, 44444, 55555, 66666 and 77777.

Soft Function Keys available with this function include:

F1 512
Selects 512 bps Data Rate. Displayed only with cursor at Data Rate Field.

F2 1200
Selects 1200 bps Data Rate. Displayed only with cursor at Data Rate Field.

F3 2400
Selects 2400 bps Data Rate. Displayed only with cursor at Data Rate Field.

F6 RETURN
Returns unit to normal RF Generator Operation.

F6 BURST
Activates POCSAG data for one sequence.

3. Code

Displays selected code for DATA Generator. Not displayed with POCSAG or POCSAG/ selected as Format (2).

4. Level

Displays selected Level of DATA Generator. Selections range from 0 to 2.5 Vp in X1 (times 1) Mode and 0 to 25.0 mVp in /10 (divide by 10) Mode.

Soft Function Keys available with this function include:

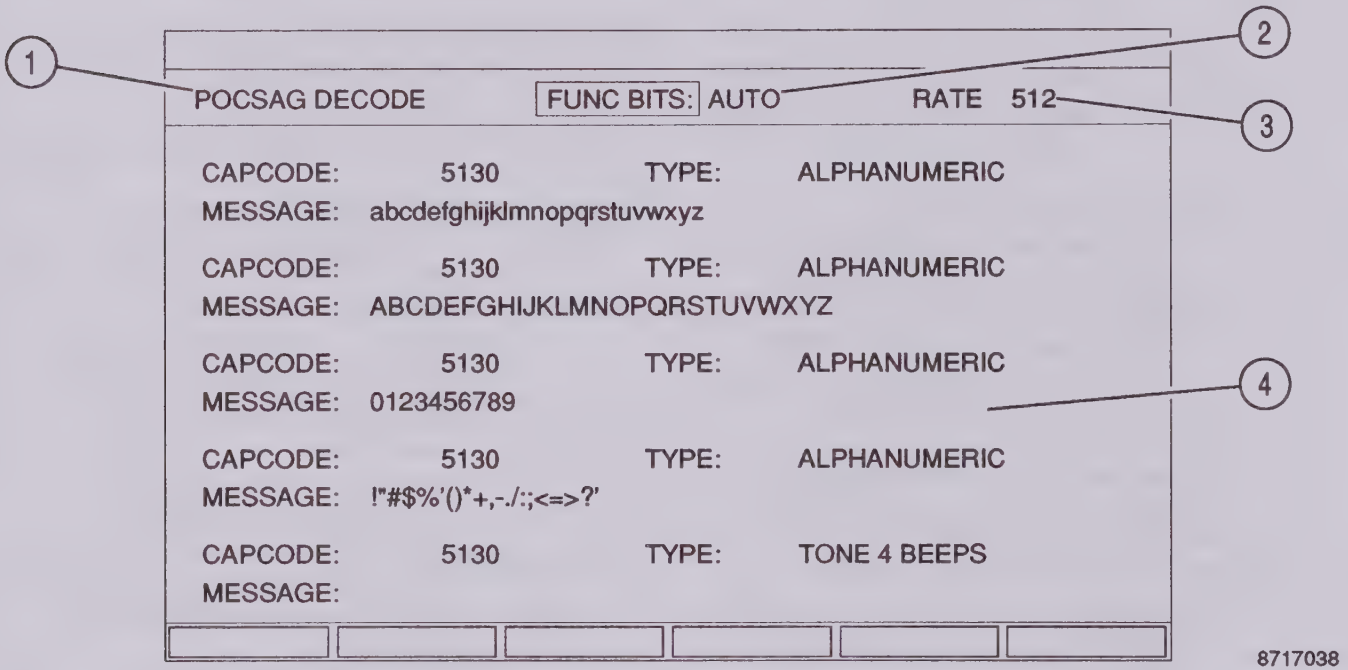
F1 X1
Activates X1 Mode for Level.

F2 /10
Activates /10 Mode for Level.

7-9-3 DECODING DIGITAL SIGNALING FORMATS

With Option 11 installed, the RF Receive Operation Screen and the Duplex Receive Operation Screen can be configured to decode POCSAG and Inverted POCSAG signals. A specific decode screen is provided for each Digital Signaling format type.

Information provided from the Decode Screens is as follows:



1. Decode Screen Label

   Identifies whether Decode Screen format is POCSAG or POCSAG INV (Inverted POCSAG).

2. Function

   Allows user to set Message Type to ALPHANO (ALPHANUMERIC), NUMERIC or AUTO. ALPHANO and NUMERIC settings force Decode Function to decode message as specified type. AUTO setting allows Decode Function to determine Message Type from received data.

Soft Function Keys available with this function include:

F1 DECODE
Activates Decode Function. Field is highlighted when active.

F2 STOP
Stops Decode Function.

F3 MENU
Accesses menu for selecting format. Soft Function Keys available with this function include:

F1 AUTO
Allows Decode Function to determine Message Type from received data.

F2 NUMERIC
Forces Decode Function to decode message as specified type.

F3 ALPHANO
Forces Decode Function to decode message as specified type.

F5 AUTOCL
Toggles Auto-Clear Function On and Off. Decode Screen (4) holds five messages. With Auto-Clear Function active, when sixth message is received, previous five messages are erased and sixth message is displayed. Field is highlighted when Auto-Clear Function is active.

F6 RETURN
Returns to previous Operation Screen.

3. Data Rate

Displays selected Data Rate for decoding messages. Selections include 512 and 1200 bps.

Soft Function Keys available with this function include:

F1 DECODE
Activates Decode Function. Field is highlighted when active.

F2 STOP
Stops Decode Function.

F3 MENU
Accesses menu for selecting format. Soft Function Keys available with this function include:

F1 512
Sets Data Rate to 512 bps.

F2 1200
Sets Data Rate to 1200 bps.

F3 2400
Sets Data Rate to 2400 bps.

F5. AUTOCL
Toggles Auto-Clear Function On and Off. Decode Screen (4) holds five messages. With Auto-Clear Function active, when sixth message is received, previous five messages are erased and sixth message is displayed. Field is highlighted when Auto-Clear Function is active.

F6 RETURN
Returns to previous Operation Screen.

4. Data Screen

Displays up to five decoded messages. Information displayed includes Capcode, Message Type and Message for each received transmission.

7-9-4 TESTING A RECEIVER USING DIGITAL SIGNALING FORMATS

This procedure is provided as an example for testing a Receiver using Digital Signaling Formats. In this procedure, an RF signal is modulated with a POCSAG message. Step by step procedures are as follows:

1. Press GEN Test Mode Key to access RF Generate Operation Screen.
2. Enter Receiver frequency in RF Field.
3. Select desired Output Connector for output of signal. If Receiver is tested with direct connection, connect Receiver Input Connector to selected Output Connector. Otherwise, connect antennas to selected Output Connector and Receiver Input Connector.
4. Set Output Level to desired level.
5. Select DATA Generator for Modulation Source.
6. Set Modulation Type to ***FM***.
7. Set Deviation Level for ***4.0 kHz*** or as required.
8. Set DATA Generator Format for ***POCSAG*** or ***POCSAG/***.
9. Press ***Config*** Soft Function Key F4.
10. Set Data Rate to required setting for Receiver.
11. Set Capcode Range to Receiver Capcode.
12. Set POCSAG Function for desired test function.
13. Press ***RETURN*** Soft Function Key F6.
14. Press ***BURST*** Soft Function Key F5.
15. Verify Receiver receives signal and decodes POCSAG Message correctly.

7-9-5 TESTING A TRANSMITTER USING DIGITAL SIGNALING FORMATS

This procedure is provided as an example for testing a Transmitter using Digital Signaling Formats. In this procedure, an RF signal is received and demodulated for the POCSAG message. Step by step procedures are as follows:

1. Press REC Test Mode Key to access RF Receive Operation Screen.

2. Enter Transmitter frequency in RF Field.

3. Select desired Input Connector for input of signal. If Transmitter is tested with direct connection, connect Transmitter Output Connector to T/R Connector. Otherwise, connect antennas to ANTENNA Connector and Transmitter Output Connector.

4. Set Demodulation Type to ***FM***.

5. Set IF Bandwidth to 15 kHz.

6. Select ***DATA DEC*** as Audio Filter. Set Filter for 20 kHz Low-Pass.

7. Select ***POCSAG*** or ***POCSAG/*** for Tone/Data Type in Tone/Data Code Field.

8. With cursor on Tone/Data Code Field press ***DECODE*** Soft Function Key F2 to access Decode Screen.

9. Set Decode Function to ***ALPHANO*** for Alphanumeric decode only, ***NUMERIC*** for Numeric decode only or ***AUTO*** for automatic selection based on POCSAG Message.

10. Set Data Rate to required setting for Transmitter.

11. If use of Auto-Clear Function is required, press ***AUTOCL*** Soft Function Key F5 until highlighted.

12. Press ***DECODE*** Soft Function Key F1 to start Decode Function.

13. Verify transmitted message is decoded properly on Decode Screen. Press ***STOP*** Soft Function Key F2 at any time to stop Decode Function.

7-10 SPECTRUM ANALYZER TRACKING GENERATOR (OPTION 12)

Provides internal Tracking Generator for use with Spectrum Analyzer. A new field is displayed for turning on the Tracking Generator. Field displays OFF or Tracking Generator Level. When active, an RF signal is available at the AUX RF OUT Connector at the specified level.

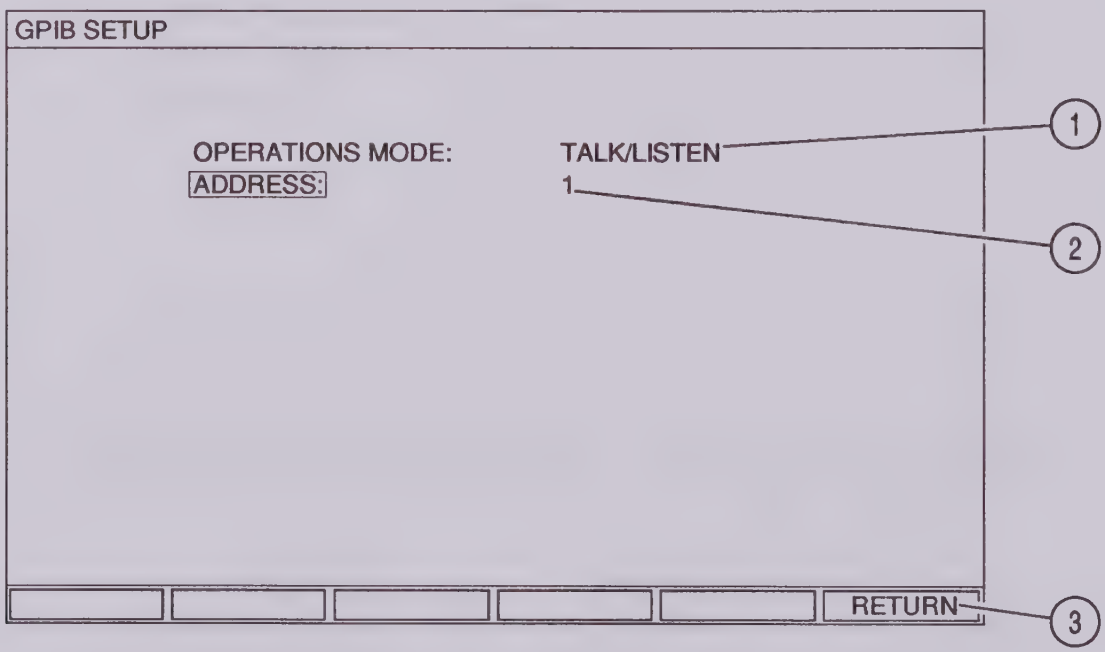
7-11 IEEE 488 (GPIB) INTERFACE (OPTION 13)

7-11-1 GENERAL

Provides parallel GPIB interface for remote operation. Refer to Section 5 for additional information on COM-120A Remote Operation and Commands listing.

7-11-2 CONFIGURING FOR REMOTE OPERATIONS USING GPIB

To access GPIB Setup Screen, Press SETUP MEMORY Key (21) and access "4. GPIB SETTINGS." Configure for GPIB Operation as follows:



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1. Select Operations Mode (1). Available selections include TALK/LISTEN, TALK ONLY and LISTEN ONLY.

2. Select GPIB Address (2). Selections range from 1 to 30.

3. Set RCI Control to *ON*

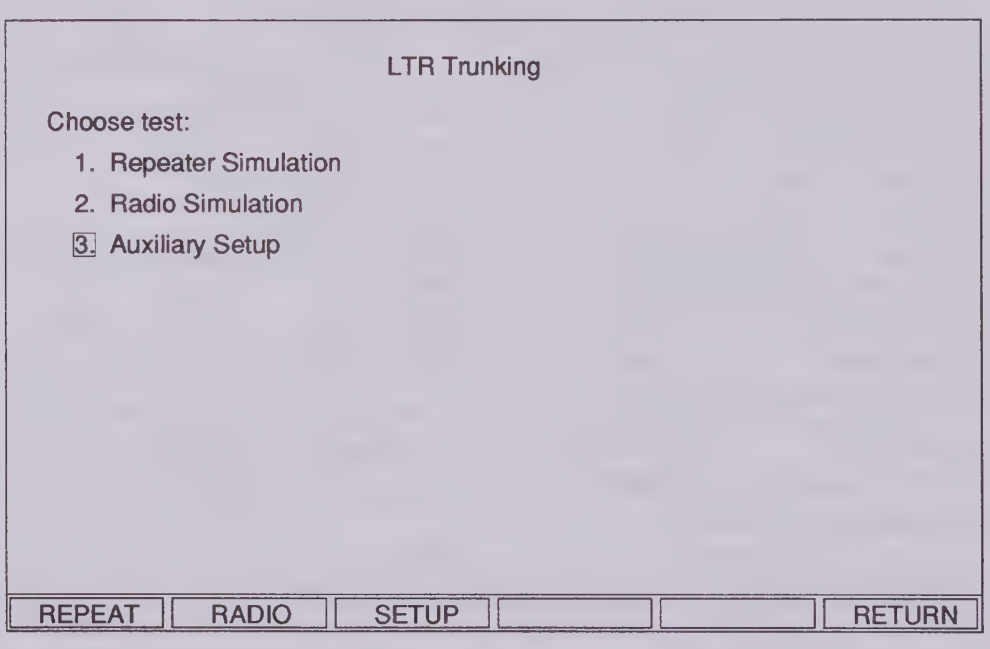
7-12 CLEARCHANNEL LTR® (OPTION 14)

7-12-1 GENERAL

The CLEARCHANNEL LTR® Option allows the testing of Trunked Repeaters and Radios. The COM-120B tests encode/decode, Repeater access and Handoff functions of Trunked Radio mobile units. The COM-120B tests Handshake and Handoff functions of Repeaters.

7-12-2 ACCESSING THE CLEARCHANNEL LTR® TRUNKING TEST SYSTEM

CLEARCHANNEL LTR® testing is accessed by pressing the SPCL Test Mode Key and accessing "3. LTR Trunking." When accessed, the LTR Trunking Menu is displayed. The LTR Trunking Functions are as follows:



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1. Repeater Simulation

   Configures COM-120B to simulate Repeater to test Mobile Radios. Refer to para 7-12-3 for description and para 7-12-6 for operation.

2. Radio Simulation

   Configures COM-120B to simulate a Mobile Radio to test Repeaters. Refer to para 7-12-4 for description and para 7-12-7 for operation.

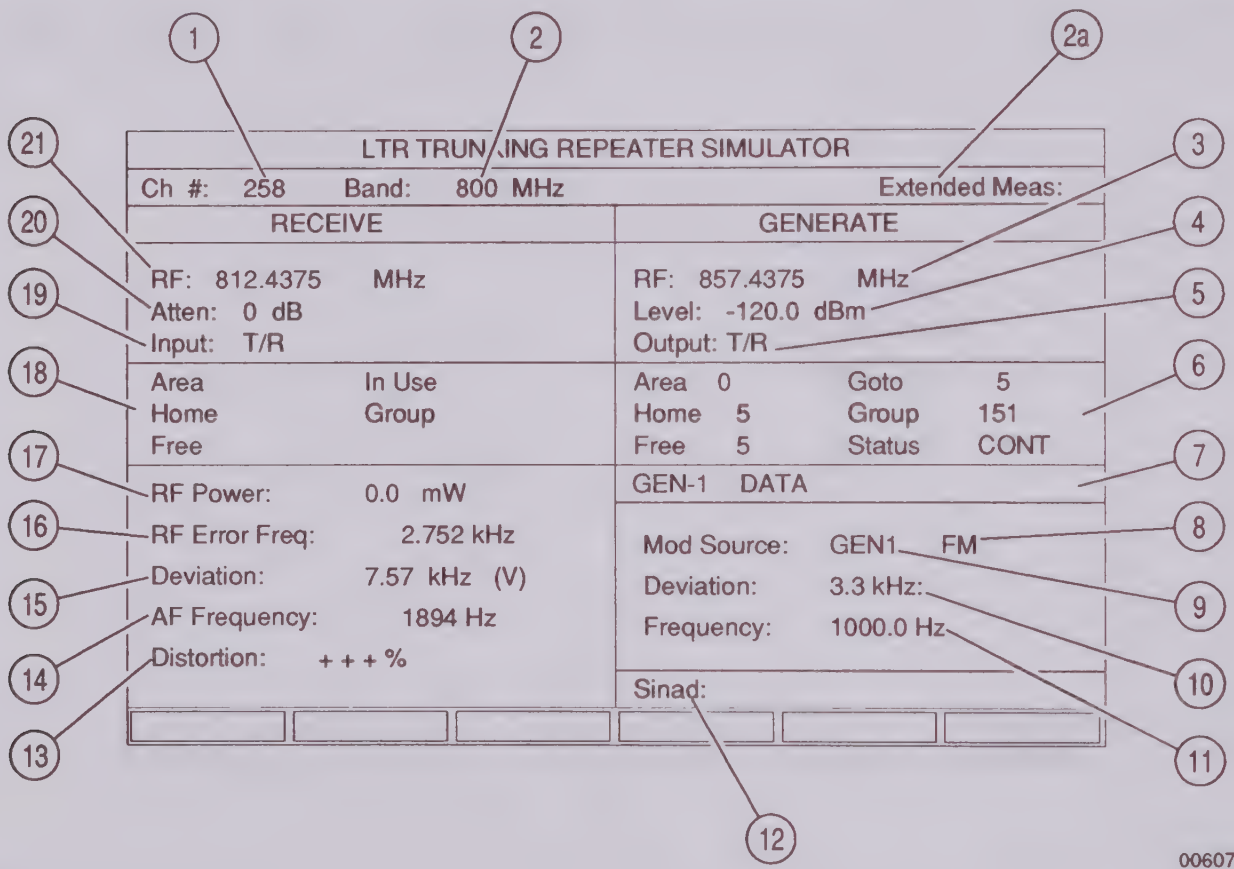
3. Auxiliary Setup

   Provides additional configuration for testing. Refer to para 7-12-5 for description.

7-12-3 LTR TRUNKING REPEATER SIMULATION

A. LTR TRUNKING REPEATER SIMULATOR OPERATION SCREEN

The LTR Repeater Simulator is designed to test mobile phones. An additional feature to the LTR Repeater Simulator Operation Screen is that once the LTR System is properly configured, continuous paging of the mobile phone is provided in the Duplex Operation Screen by setting DATA Generator to LTR. Features of the LTR Trunking Repeater Simulator Operation Screen are as follows:



1. Channel Number

Displays Channel Number. Selections are 1 to 760. Selection of Channel Number and Band Selection (2) set Generate RF Field (3) and Receive RF Field (21).

Soft Function Keys available with this function include:

F1 DEC CLR
Clears the decoded area manually. Fresh data is now displayed and recognized.

F6 RETURN
Returns Operation to LTR Trunking Menu.

2. Band Selection

Displays Trunking Band Selection. Displays 800 or 900 MHz.

Soft Function Keys available with this function include:

F1 800 MHz
Selects 800 MHz Trunking Band.

F2 900 MHz
Selects 900 MHz Trunking Band.

F6 RETURN
Returns Operation to LTR Trunking Menu.

2a. Extended Meas:

Allows for Extended Measurements.

Soft Function Keys available with this function include:

F1 SCOPE
Accesses LTR Trunking Scope.

F2 ANALY
Accesses Full View Analyzer.

F3 DVM
Accesses LTR Trunking Digital Voltmeter.

3. Generate RF Field

Displays RF Generate Frequency of COM-120B. Value is dependent on Channel Number (1) and Band Selection (2). Field is for display only. Formula for figuring value is as follows where Channel # is Channel Number (1):

800 MHz Band Selection (2)

Frequency (MHz) = 851.0125 + [.025 x (Channel # - 1)]

900 MHz Band Selection (2)

Frequency (MHz) = 935.0125 + (.025 x Channel #)

Radios operating in 800 MHz Band within range of Canada or Mexico must use a -12.5 kHz offset.

4. Level

Displays Output Level. Range is dependent on Output (5). Range for Output (5) set to T/R is -130 to -20 dBm. Range for Output (5) set to AUX is -130 to -13 dBm.

Soft Function Keys available with this function include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

5. Output

Displays Output Connector. Selections are T/R (T/R Connector) and AUX (AUX RF OUT Connector).

Soft Function Keys available with this function include:

F1 T/R
Selects T/R Connector as output connector.

F2 AUX
Selects AUX RF OUT Connector as output connector.

F6 RETURN
Returns Operation to LTR Trunking Menu.

6. Transmit Trunking Data Block

Displays current data being passed to mobile radio. Refer to 7-12-3(B) for additional information.

7. Modulation Source Window

Displays active Modulation Sources (9). Inactive Modulation Sources (9) are not shown. If two (or more) sections of the RF Modulator are set in conflict (e.g. GEN1 set for PM and GEN2 set for FM, or GEN1 set for 0.01 kHz deviation and GEN2 set for 2.60 kHz deviation) then the screen shows the invalid source grayed out.

8. Modulation Source

Displays selected Modulation Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator) and DATA (DATA Generator).

Soft Function Keys available with this function include:

F1 GEN-1
Accesses Audio Generator 1 parameters.

F2 GEN-2
Accesses Audio Generator 2 parameters.

F3 DATA
Accesses DATA Generator parameters.

F4 DTMF
Accesses DTMF Generator parameters.

F6 RETURN
Returns Operation to LTR Trunking Menu.

9. Modulation Type

Displays selected Modulation Type. Selections include OFF, AM, FM and PM.

Soft Function Keys available with this function include:

F1 OFF
Sets Modulation Source (9) to OFF.

F2 AM
Selects AM as Modulation Type.

F3 FM
Selects FM as Modulation Type.

F4 PM
Selects PM as Modulation Type.

F6 RETURN
Returns Operation to LTR Trunking Menu.

10. Deviation/Modulation Level

Displays selected Deviation in kHz if current Modulation Type (8) is FM with range from 0.00 to 100 kHz. Displays selected Percent Modulation if current Modulation Type (8) is AM with range from 0.0% to 100%. Displays selected Deviation in Radians if current Modulation Type (8) is PM with range from 0.00 to 10 Radians. Field is not displayed if Modulation Type (8) is OFF.

Soft Function Keys available with this function include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

11. Frequency/Code Field

If Modulation Source (7) is set for GEN1 or GEN2, displays Tone Frequency. GEN2 Frequency is not an editable field unless Option Generator 2 is installed. Range for GEN1 is 0.0 to 20000 Hz. If Modulation Source (7) is set for DTMF, displays DTMF Code. Any DTMF code can be entered up to 16 characters and other softkeys become available. If Modulation Source (7) is set for DATA, field is blank.

Soft Function Keys available with this function include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

12. AUDIO/DATA IN Meters

Displays selected meter for measuring audio input to AUDIO/DATA IN Connector. Selections include Distortion, SINAD and AF LEVEL Meters. If one of these meters is active, Deviation Meter (15), AF Frequency Meter (14), Distortion/DTMF Meter (13) and LTR decoding are deactivated.

Soft Function Keys available with this function include:

F1 DIST
Selects Distortion Meter as active meter.

F2 SINAD
Selects SINAD Meter as active meter.

F3 AF LVL
Selects AF Level as active meter.

F4 OFF
Deactivates AUDIO/DATA IN Meters and activates Deviation Meter (15), AF Frequency Meter (14) and Distortion/DTMF Meter (13).

F6 RETURN
Returns Operation to LTR Trunking Menu.

13. Distortion/DTMF Meters

Displays Distortion or DTMF. If Distortion is displayed as meter, distortion of demodulated signal is measured. If DTMF is displayed as meter, displays decoded DTMF Code from demodulated signal.

Soft Function Keys available with this function include:

F1 DIST
Selects Distortion Meter as active meter.

F2 OFF
Deactivates this meter.

F3 DTMF
Selects DTMF Decoding for field.

F6 RETURN
Returns Operation to LTR Trunking Menu.

14. AF Frequency Counter

Displays AF Frequency of demodulated signal. Field is for display only.

15. Deviation Meter

Displays Deviation for data or audio (voice) as selected by operator. If Voice is Deviation Measurement is selected, (V) appears beside meter reading. If Data is selected, (D) appears beside meter reading.

Soft Function Keys available with this function include:

F1 DATA
Selects DATA Deviation measurement.

F2 VOICE
Selects VOICE Deviation measurement.

F3 FMZ
Calibrates FM Detector when dc coupled.

F4 FM CAL
Offsets FM Detector to compensate for Transmitter Frequency Error in LTR Radio. Offsetting FM Detector "tunes" data decoder that decodes data from LTR Radio.

F6 RETURN
Returns Operation to LTR Trunking Menu.

16. RF Error Meter

Displays frequency error of LTR Transmitter referenced to Receive RF Field (21). Field is for display only.

17. RF Power Meter/RF Level Meter

Displays RF Power, in Watts, applied to T/R Connector. If ANT is selected for Input (19), RF Level Meter appears. Field is for display only.

18. Receive Trunking Data Block

Displays data being passed from mobile radio. Refer to 7-12-3(C) for additional information.

19. Input

Displays selected Input Connector. Selections are ANT (ANTENNA Connector) or T/R (T/R Connector).

Soft Function Keys available with this function include:

F1 T/R
Selects T/R Connector as Input Connector.

F2 ANT
Selects ANTENNA Connector as Input Connector.

F6 RETURN
Returns Operation to LTR Trunking Menu.

20. Attenuation

Displays selected Input Attenuation. Selections are 0 or 30 dB.

Soft Function Keys available with this function include:

F1 30 dB
Selects 30 dB Input Attenuation.

F2 0 dB
Selects 0 dB Input Attenuation.

F6 RETURN
Returns Operation to LTR Trunking Menu.

21. Receive RF Field

Displays RF Receive Frequency of COM-120B. Value is dependent on Channel Number (1) and Band Selection (2). Field is for display only. Formula for figuring value is as follows where Channel # is Channel Number (1):

800 MHz Band Selection (2)

Frequency (MHz) = 806.0125 + [.025 x (Channel # - 1)]

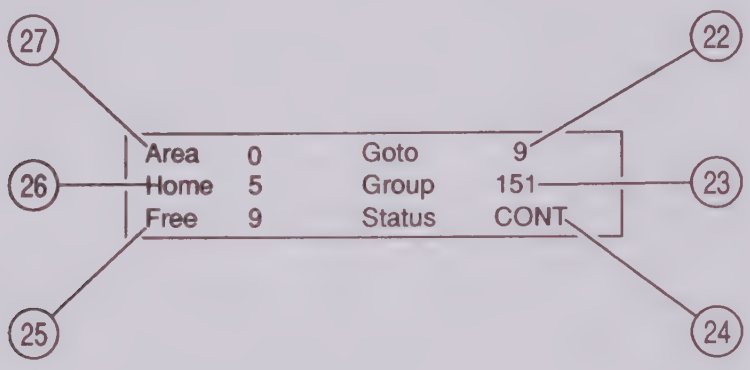
900 MHz Band Selection (2)

Frequency (MHz) = 896.0125 + (.025 x Channel #)

Radios operating in 800 MHz Band within range of Canada or Mexico must use a -12.5 kHz offset.

B. TRANSMIT TRUNKING DATA BLOCK

The Transmit **Trunking Data Block** is used to set the Repeater paramaters that are passed to the Mobile Radios. This information, as well as the Channel Number (1) and Band Selection are required to test a Mobile Radio. A list of the Data Fields and available parameters follow:



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22. Goto

Displays Repeater Number to use for Status (24) set to Continuous. Must match Home (26) for Mobile Radio to unsquelch. Range is 1 to 31.

Soft Function Keys available with this function include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

23. Group

Displays ID Code for Mobile Radio to Test. Range is 1 to 255. Information is passed when Repeater transmits to access selected Mobile Radio.

Soft Function Keys available with this function include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

24. Status

Displays Status for Repeater for testing Mobile Radio. Set to FREE (Free Home Repeater), BUSY (Busy Home Repeater), CONT (Continuous transmit by Home Repeater) and DISCN (Disconnect Repeater-Mobile link). If CONT is desired, Goto (22) must match Home (26).

Soft Function Keys available with this function include:

F1 FREE
Sets Status to FREE (Free Home Repeater).

F2 BUSY
Sets Status to BUSY (Busy Home Repeater).

F3 CONT
Sets Status to CONT

(Continuous transmit by Home Repeater).

F4 DISCN
Sets Status to DISCN (Disconnect Repeater-Mobile link).

F6 RETURN
Returns Operation to LTR Trunking Menu.

25. Free

Displays Repeater Number used for Mobile transmission with Status (24) set to BUSY. Free Repeater Channel on LTR Trunking Auxiliary Setup Screen (para 7-12-4) must also be set for proper operation. Range is 1 to 31.

26. Home

Displays Home Repeater Number used for testing Mobile Radios. Range is 1 to 31.

27. Area

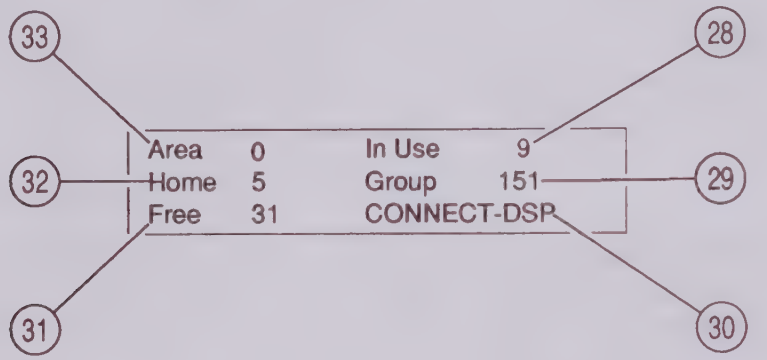
Displays Proximity Switch setting. Range is 1 or 0.

Soft Function Keys available with this function include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

C. RECEIVE TRUNKING DATA BLOCK

The Receive Trunking Data Block is used to display the Mobile Radio paramaters that are passed to the Repeater. This information is for display only and cannot be edited. A list of the Data Fields and available parameters follow:



28. In Use

Displays Repeater Number used by Mobile Radio. Displays 31 at message end to signify end of transmission.

29. Group

Displays ID Code for Mobile Radio.

30. Radio Status

Displays Mobile Radio Status. If CONNECT-DSP is displayed, Radio is currently linked to COM-120B in Dispatch Mode. If CONNECT-RIC is displayed, Radio is currently linked to COM-120B in Radio Interconnect Mode. If RELEASE is displayed, indicates COM-120B has received disconnect code from from Mobile Radio. If DISCONNECT is displayed, indicates Mobile Radio and Repeater are no longer connected due to manual disconnect or COM-120B disconnect due to elapsed time.

31. Free

Displays Free Field Data received from data. Displays 31 during normal operation.

32. Home

Displays Home Repeater Number for Mobile Radio. Range is 1 to 31.

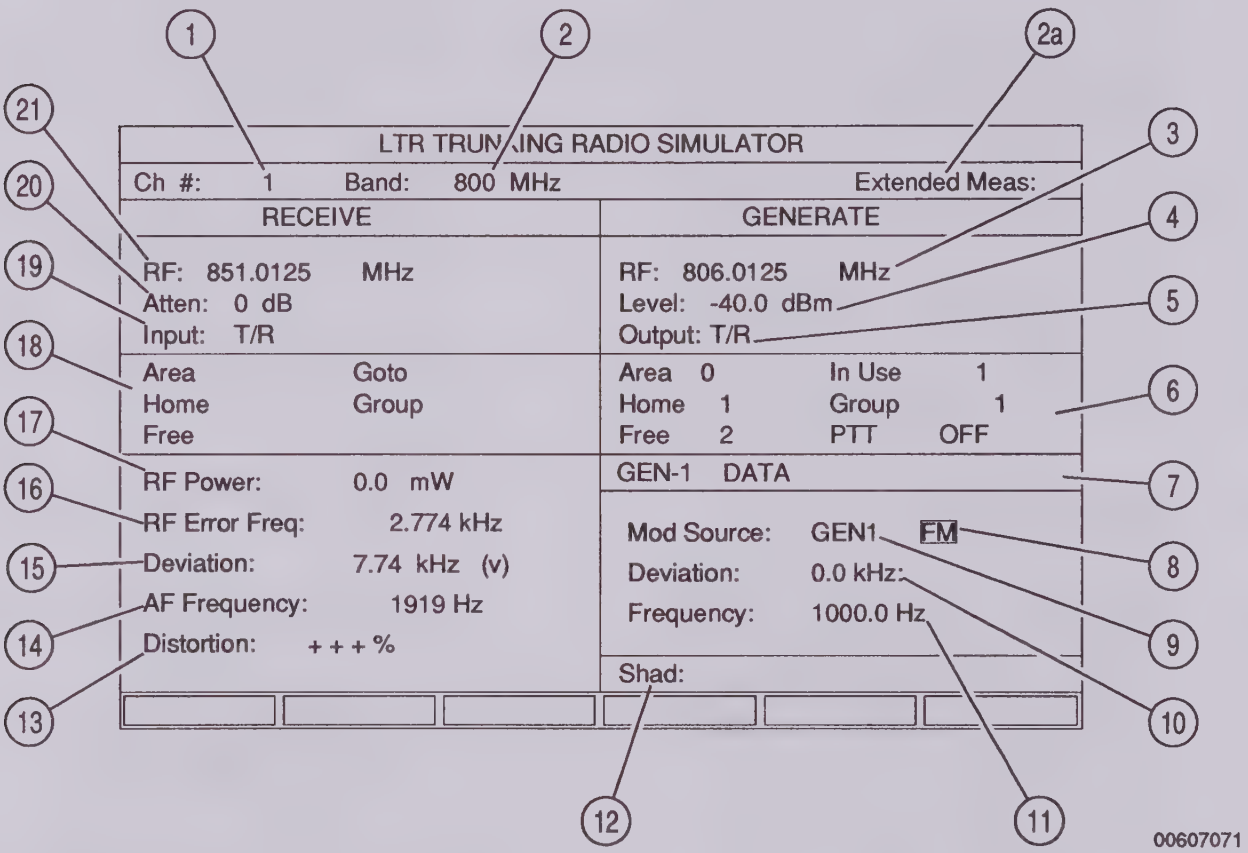
33. Area

Displays Proximity Switch setting. Displays 1 or 0.

7-12-4 LTR TRUNKING RADIO SIMULATION

A. LTR TRUNKING RADIO SIMULATOR OPERATION SCREEN

Features of the LTR Trunking Radio Simulator Operation Screen are as follows:



1. Channel Number

Displays Trunking Channel Number. Selections range from 1 to 760. Selection of Channel Number and Band Selection (2) is used to set Generate RF Field (3) and Receive RF Field (21).

Soft Function Keys available with this function include:

F1 DEC CLR
Clears the decoded area manually. Fresh data is now displayed and recognized.

F6 RETURN
Returns Operation to LTR Trunking Menu.

2. Band Selection

Displays Trunking Band Selection. Displays 800 or 900 MHz.

Soft Function Keys available with this function include:

F1 800 MHz
Selects 800 MHz Trunking Band.

F2 900 MHz
Selects 900 MHz Trunking Band.

F6 RETURN
Returns Operation to LTR Trunking Menu.

2a. Extended Meas:

Allows for Extended Measurements.

Soft Function Keys available with this function include:

F1 SCOPE
Accesses LTR Trunking Scope.

F2 ANALY
Accesses Full View Analyzer.

F3 DVM
Accesses LTR Trunking Digital Voltmeter.

3. Generate RF Field

Displays RF Generate Frequency of COM-120B. Value is dependent on Channel Number (1) and Band Selection (2). Field is for display only. Formula for figuring value is as follows where Channel # is Channel Number (1):

800 MHz Band Selection (2)

Frequency (MHz) = 806.0125 + [.025 x (Channel # - 1)]

900 MHz Band Selection (2)

Frequency (MHz) = 896.0125 + (.025 x Channel #)

Radios operating in 800 MHz Band within range of Canada or Mexico must use a -12.5 kHz offset.

4. Level

Displays Output Level. Range is dependent on Output (5). Range for Output (5) set to T/R is -130 to -20 dBm. Range for Output set to AUX is -130 to -13 dBm.

Soft Function Keys available with this function include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

5. Output

Displays Output Connector. Selections are T/R (T/R Connector) and AUX (AUX RF OUT Connector).

Soft Function Keys available with this function include:

F1 T/R
Selects T/R Connector as output connector.

F2 AUX
Selects AUX RF OUT Connector as output connector.

F6 RETURN
Returns Operation to LTR Trunking Menu.

6. Transmit Trunking Data Block

Displays current data being passed to Repeater. Refer to 7-12-4(B) for additional information.

7. Modulation Source Window

Displays active Modulation Sources (9). Inactive Modulation Sources (9) are not shown. If two (or more) sections of the RF Modulator are set in conflict (e.g. GEN1 set for PM and GEN2 set for FM, or GEN1 set for 0.01 kHz deviation and GEN2 set for 2.60 kHz deviation) then the screen shows the invalid source grayed out.

8. Modulation Source

Displays selected Modulation Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator) and DATA (DATA Generator).

Soft Function Keys available with this function include:

F1 GEN-1
Accesses Audio Generator 1 parameters.

F2 GEN-2
Accesses Audio Generator 2 parameters.

F3 DATA
Accesses DATA Generator parameters.

F4 DTMF
Accesses DTMF Generator parameters.

F6 RETURN
Returns Operation to LTR Trunking Menu.

9. Modulation Type

Displays selected Modulation Type. Selections include OFF, AM, FM and PM.

Soft Function Keys available with this function include:

F1 OFF
Sets Modulation Source (9) to OFF.

F2 AM
Selects AM as Modulation Type.

F3 FM
Selects FM as Modulation Type.

F4 PM
Selects PM as Modulation Type.

F6 RETURN
Returns Operation to LTR Trunking Menu.

10. Deviation/Modulation Level

Displays selected Deviation in kHz if current Modulation Type (8) is FM with range from 0.00 to 100 kHz. Displays selected Percent Modulation if current Modulation Type (8) is AM with range from 0.0% to 100%. Displays selected Deviation in Radians if current Modulation Type (8) is PM with range from 0.0 to 10 Radians. Field is not displayed if Modulation Type (8) is OFF.

Soft Function Keys available with this function include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

11. Frequency/Code Field

If Modulation Source (7) is set for GEN1 or GEN2, displays Tone Frequency. GEN2 Frequency is not an editable field unless Option Generator 2 is installed. Range for GEN1 is 0.0 to 20000 Hz. If Modulation Source (7) is set for DTMF, displays DTMF Code. Any DTMF code can be entered up to 16 characters and other softkeys become available. If Modulation Source (7) is set for DATA, field is blank.

Soft Function Keys available with this function include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

12. AUDIO/DATA IN Meters

Displays selected meter for measuring audio input to AUDIO/ DATA IN Connector. Selections include Distortion, SINAD and AF LEVEL Meters. If one of these meters is active, Deviation Meter (15), AF Frequency Meter (14), Distortion/DTMF Meter (13) and LTR Trunking are deactivated.

Soft Function Keys available with this function include:

F1 DIST
Selects Distortion Meter as active meter.

F2 SINAD
Selects SINAD Meter as active meter.

F3 AF LVL
Selects AF Level as active meter.

F4 OFF
Deactivates AUDIO/DATA IN Meters and activates Deviation Meter (15), AF Frequency Meter (14) and Distortion/DTMF Meter (13).

F6 RETURN
Returns Operation to LTR Trunking Menu.

13. Distortion Meter

Displays distortion of demodulated signal.

Soft Function Keys available with this function include:

F1 DIST
Selects Distortion Meter as active meter.

F2 OFF
Deactivates meter.

F6 RETURN
Returns Operation to LTR Trunking Menu.

14. AF Frequency Counter

Displays AF Frequency of demodulated signal. Field is for display only.

15. Deviation Meter

Displays Deviation for data or audio (voice) as selected by operator. If Voice is Deviation Measurement is selected, (V) appears beside meter reading. If Data is selected, (D) appears beside meter reading.

Soft Function Keys available with this function include:

F1 DATA
Selects DATA Deviation measurement.

F2 VOICE
Selects VOICE Deviation measurement.

F3 FMZ
Calibrates FM Detector when dc coupled.

F4 FM CAL
Offsets FM Detector to compensate for Transmitter Frequency Error in LTR Radio. Offsetting FM Detector "tunes" data decoder that decodes data from Repeater.

F6 RETURN
Returns Operation to LTR Trunking Menu.

16. RF Error Meter

Displays frequency error of Repeater referenced to Receive RF Field (21). Field is for display only.

17. RF Power Meter/RF Level Meter

Displays RF Power, in Watts, applied to T/R Connector. If ANT is selected for Input (19), RF Level Meter appears. Field is for display only.

18. Receive Trunking Data Block

Displays data being passed from Repeater. Refer to 7-12-4(C) for additional information.

19. Input

Displays selected Input Connector. Selections are ANT (ANTENNA Connector) or T/R (T/R Connector).

Soft Function Keys available with this function include:

F1 T/R
Selects T/R Connector as Input Connector.

F2 ANT
Selects ANTENNA Connector as Input Connector.

F6 RETURN
Returns Operation to LTR Trunking Menu.

20. Attenuation

Displays selected Input Attenuation. Selections are 0 or 30 dB.

Soft Function Keys available with this function include:

F1 30 dB
Selects 30 dB Input Attenuation.

F2 0 dB
Selects 0 dB Input Attenuation.

F6 RETURN
Returns Operation to LTR Trunking Menu.

21. Receive RF Field

Displays RF Receive Frequency of COM-120B. Value is dependent on Channel Number (1) and Band Selection (2). Field is for display only. Formula for figuring value is as follows where Channel # is Channel Number (1):

800 MHz Band Selection (2)

Frequency (MHz) = 851.0125 + [.025 x (Channel # - 1)]

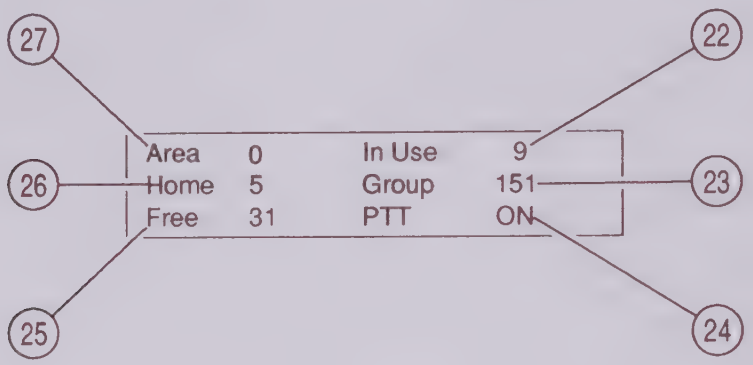
900 MHz Band Selection (2)

Frequency (MHz) = 935.0125 + (.025 x Channel #)

Radios operating in 800 MHz Band within range of Canada or Mexico must use a -12.5 kHz offset.

B. TRANSMIT TRUNKING DATA BLOCK

The Transmit Trunking Data Block is used to set the Mobile Radio paramaters that are passed to the Repeater. This information, as well as the Channel Number (1) and Band Selection are required to test a Repeater. A list of the Data Fields and available parameters follows:



22. In Use

Displays Repeater Number used by Mobile Radio. Displays 31 at message end to signify end of transmission. Range is 1 to 31.

Soft Function Keys available with this function include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

23. Group

Displays ID Code for Mobile Radio serviced by Repeater. Range is 1 to 255.

Soft Function Keys available with this function include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

24. PTT

Displays Push-To-Talk Status passed to Repeater. Displays ON or OFF. Push-To-Talk Status is toggled by pressing START/STOP CONTROL Key (6) or use the MIC Accessory PTT.

25. Free

Not used by Mobile Radios. Field is editable, but should contain 31 for normal operation. Range is 1 to 31.

Soft Function Keys available with this function include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

26. Home

Displays Home Repeater Number for Mobile Radio. Range is 1 to 31.

Soft Function Keys available with this function include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

27. Area

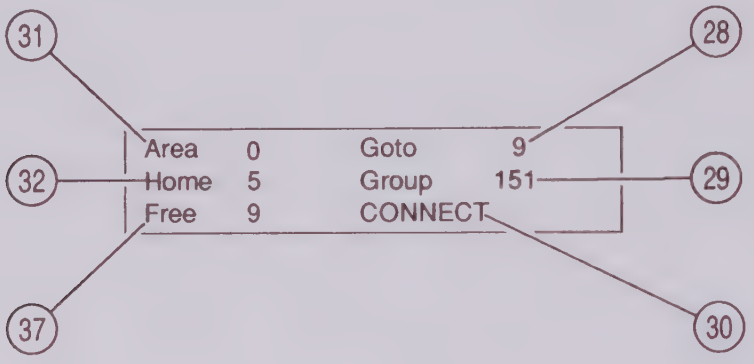
Displays Proximity Switch setting. Range is 1 or 0.

Soft Function Keys available with this function include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

C. RECEIVE TRUNKING DATA BLOCK

The Receive Trunking Data Block is used to display the Repeater paramaters that are passed to the Mobile Radio. This information is for display only and cannot be edited. A list of the Data Fields and available parameters follow:



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28. Goto

Displays number of Repeater being tested. Display of 31 indicates end of transmission for Repeater.

29. Group

Displays ID Code specified by Group (23).

30. Repeater Status

Displays Repeater-Mobile Radio Connection Status. Displays CONNECT if Repeater is receiving COM-120B signal. Blank if not receiving signal.

31. Free

Displays Free Repeater data sent to COM-120B.

32. Home

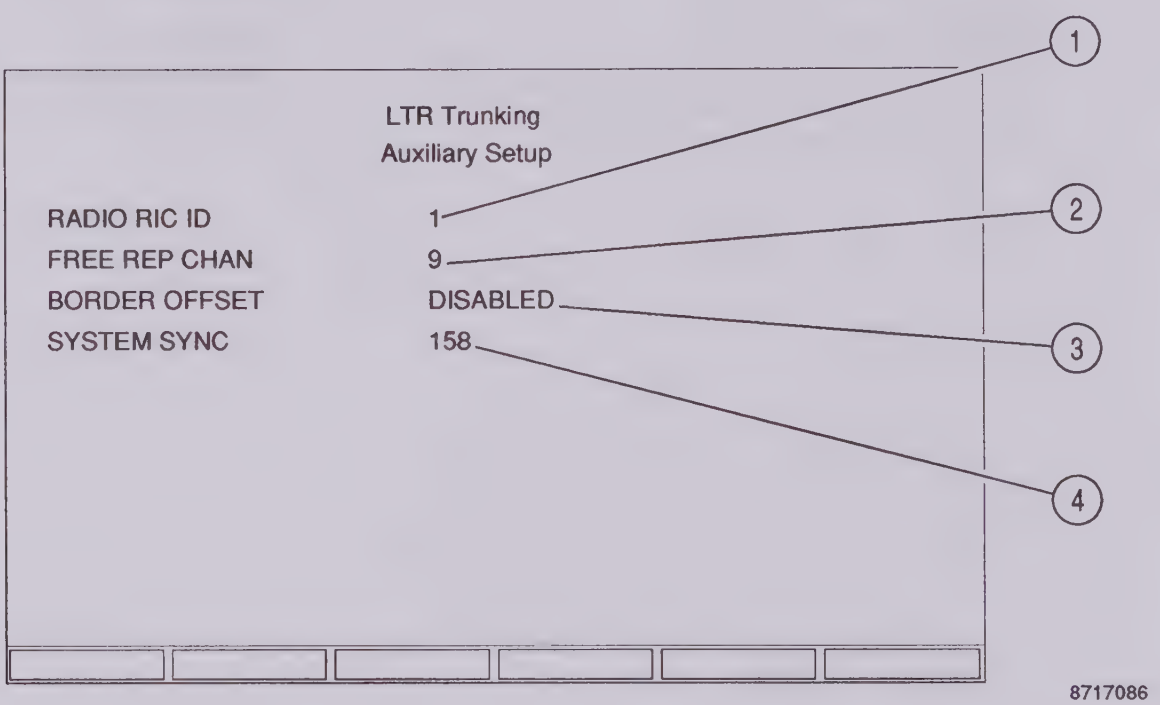
Displays Home Repeater data sent by Repeater to COM-120B. Range is 1 to 31.

33. Area

Displays Proximity Switch setting. Displays 1 or 0.

7-12-5 LTR TRUNKING AUXILIARY SETUP SCREEN

The LTR Trunking Auxiliary Setup Screen is provided to setup additional System Parameters not covered in the Simulation Screens. Additional System Parameters and available entries are as follows:



1. RADIO RIC ID

   Displays Mobile Radio Radio Interconnect Channel Number. Range is 1 to 250.

   Soft Function Keys available with this function include:

   F6 RETURN
   Returns Operation to LTR Trunking Menu.

2. FREE REP CHAN

   Displays Free Repeater Channel Number for Free Repeater specified on LTR Trunking Repeater Simulator Operation Screen. Range is 1 to 760.

   Soft Function Keys available with this function include:

   F6 RETURN
   Returns Operation to LTR Trunking Menu.

3. BORDER OFFSET

   Displays status of Border Offset to RF due to proximity to Canadian or Mexican Border. Displays ENABLED or DISABLED.

   Soft Function Keys available with this function include:

   F1 DISABLE
   Disables Border Offset.

F2 ENABLE
Enables Border Offset.

F6 RETURN
Returns Operation to LTR Trunking Menu.

4. SYSTEM SYNC

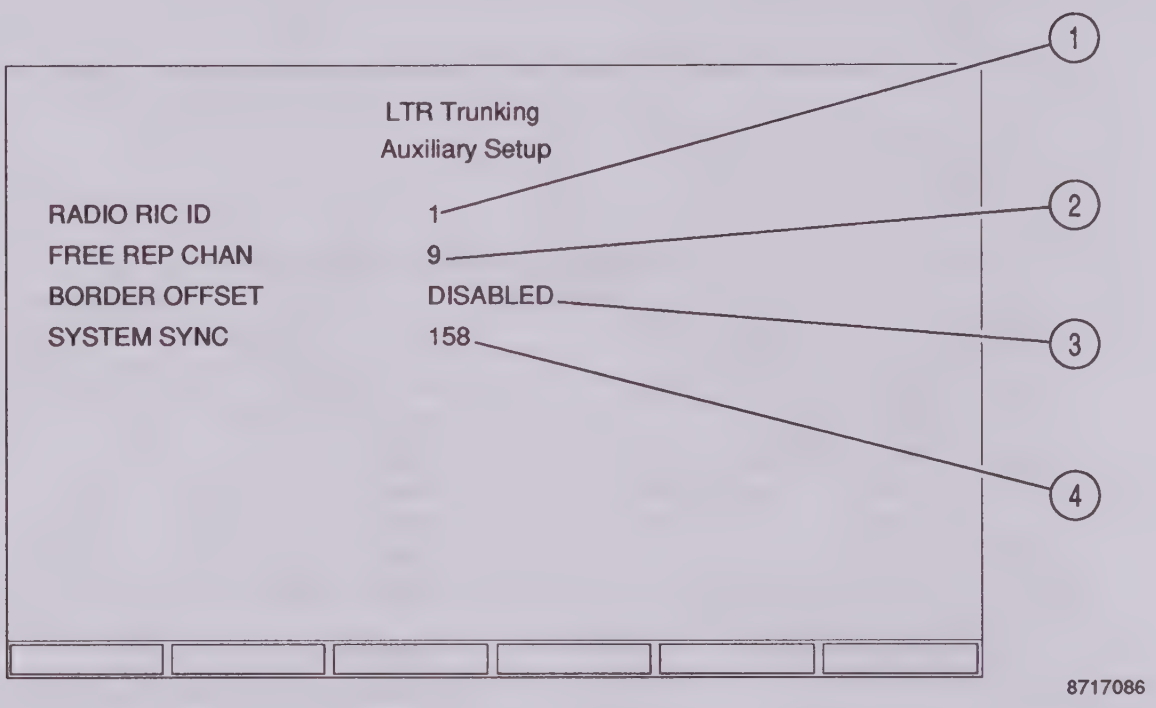
Displays hexadecimal code used for System Sync Code in Data Word. Default value is 158 (Hexadecimal). Range of value is 0 to 1FF (Hexadecimal).

Soft Function Keys available with this function include:

F6 RETURN
Returns Operation to LTR Trunking Menu.

7-12-6 AUXILIARY SETUP SCREEN CONFIGURATION

The LTR Trunking Auxiliary Setup Screen must be configured before operating the LTR Trunking Repeater Simulator (para 7-12-7) or the LTR Trunking Radio Simulator (para 7-12-8). Configure the LTR Trunking Auxiliary Setup Screen as follows:



1. From LTR Trunking Menu, select "3. Auxiliary Setup."

2. If Mobile Radio RIC Test is required, set RADIO RIC ID (1) to Radio Interconnect Channel (RIC). IF RIC Operation is not required, set to value that will not interfere with Dispatch Operation.

3. If Mobile Radio Busy Home Repeater Test is desired, enter Free Repeater Channel for FREE REP CHAN (2).

4. If testing devices set for Border Offset, set BORDER OFFSET (3) to ***ENABLED***. If Border Offset is not required, set BORDER OFFSET (3) to ***DISABLED***.

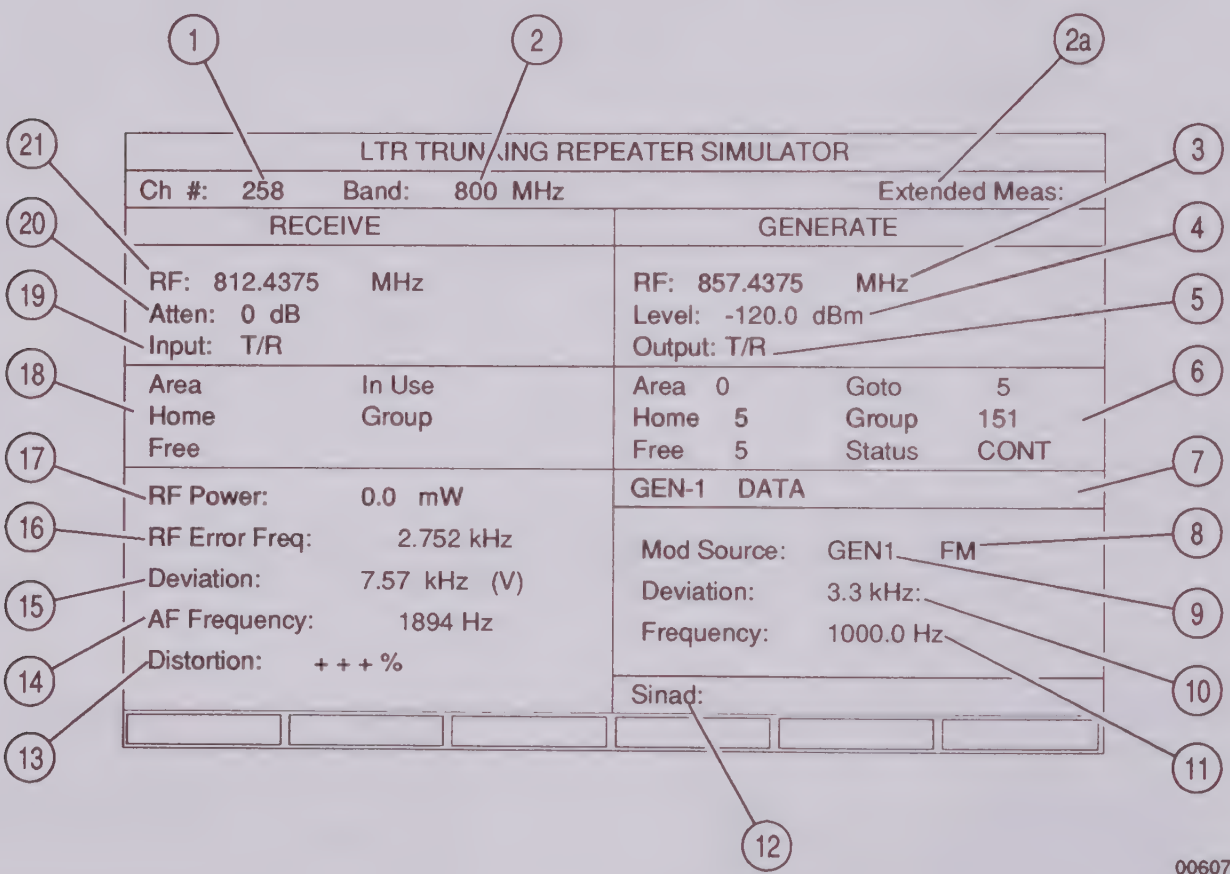
5. Set SYSTEM SYNC (4) to ***158*** unless nonstandard system is tested.

6. Press RETURN Soft Function Key F6 to return to LTR Trunking Menu.

7-12-7 REPEATER SIMULATOR OPERATION

The Repeater Simulator is used to test LTR Mobile Radios. To test LTR Mobile Radios, knowledge of the Radio Configuration Data, for the Radio under test, is required. This section is divided into paragraphs with the first paragraph being General Configuration and the remaining paragraphs being different tests. For each test, the General Configuration should be performed first.

A. LTR TRUNKING REPEATER SIMULATOR GENERAL CONFIGURATION



1. Configure Auxiliary Setup Screen (para 7-12-5).

2. From LTR Trunking Menu, select "1. Repeater Simulation."

3. Enter Channel Number (1) of Mobile Radio. Range is 1 to 760.

4. Choose Band Selection (2). Selections are 800 or 900 MHz. Select as follows:

   - Press 800 MHz Soft Function Key F1 to select 800 MHz Band.
   - Press 900 MHz Soft Function Key F2 to select 900 MHz Band.

5. Select Output (5) for COM-120B Generator. Selections are T/R (T/R Connector) or AUX (AUX RF OUT Connector). Select as follows:

- Press T/R Soft Function Key F1 to select T/R Connector.
- Press AUX Soft Function Key F2 to select AUX RF OUT Connector.

6. Set Level (4) to desired Output Level. Range for Output (5) set to T/R is -130 to -40 dBm. Range for Output (5) set to AUX is -130 to -13 dBm.

7. Activate Modulation Source (9) as required. If two (or more) sections of the RF Modulator are set in conflict (e.g. GEN1 set for PM and GEN2 set for FM, or GEN1 set for 0.01 kHz deviation and GEN2 set for 2.60 kHz deviation) then the screen shows the invalid source grayed out. Activate as follows:
   - Activate GEN1 as follows:
     - With cursor at Modulation Source (9), press GEN1 Soft Function Key F1.
     - Set Modulation Type (8) as follows:
       - Press OFF Soft Function Key F1 to set Modulation Type (8) to ***OFF***.
       - Press AM Soft Function Key F2 to set Modulation Type (8) to ***AM***.
       - Press FM Soft Function Key F3 to set Modulation Type (8) to ***FM***.
       - Press PM Soft Function Key F4 to set Modulation Type (8) to ***PM***.
     - Set Deviation/Modulation Level to required level. With Modulation Type (8) set to ***FM***, range is 0.00 to 100 kHz. With Modulation Type (8) set to AM, range is 0.0% to 100%. With Modulation Type (8) set to PM, range is 0.00 to 10 Radians.
     - Set Audio Frequency for Frequency/Code Field (11). Range is 0.0 to 20000.0 Hz.
   - Activate GEN2 as follows:
     - With cursor at Modulation Source (9), press GEN2 Soft Function Key F2.
     - Set Modulation Type (8) as follows:
       - Press OFF Soft Function Key F1 to set Modulation Type (8) to ***OFF***.
       - Press AM Soft Function Key F2 to set Modulation Type (8) to ***AM***.
       - Press FM Soft Function Key F3 to set Modulation Type (8) to ***FM***.
       - Press PM Soft Function Key F4 to set Modulation Type (8) to ***PM***.
     - Set Deviation/Modulation Level to required level. With Modulation Type (8) set to ***FM***, range is 0.00 to 100 kHz. With Modulation Type (8) set to AM, range is 0.0% to 100%. With Modulation Type (8) set

to PM, range is 0.00 to 10 Radians.

- Activate DTMF as follow:
  - With cursor at Modulation Source (9), press GEN1 Soft Function Key F1.
  - Set Modulation Type (8) as follows:
    - Press OFF Soft Function Key F1 to set Modulation Type (8) to ***OFF***.
    - Press AM Soft Function Key F2 to set Modulation Type (8) to ***AM***.
    - Press FM Soft Function Key F3 to set Modulation Type (8) to ***FM***.
    - Press PM Soft Function Key F4 to set Modulation Type (8) to ***PM***.
  - Set Deviation/Modulation Level to required level. With Modulation Type (8) set to ***FM***, range is 0.0 to 100 kHz. With Modulation Type (8) set to AM, range is 0% to 100%. With Modulation Type (8) set to PM, range is 0 to 10 Radians.
  - Enter Code for Frequency/Code Field (11).
- Activate DATA as follows:
  - With cursor at Modulation Source (9), press DATA Soft Function Key F4.
  - DATA Modulation Type (8) must be set to ***FM*** for the Repeater Simulator to communicate with Mobile Radios, however, the field is editable. Set Modulation Type (8) as follows:
    - Press OFF Soft Function Key F1 to set Modulation Type (8) to ***OFF***.
    - Press AM Soft Function Key F2 to set Modulation Type (8) to ***AM***.
    - Press FM Soft Function Key F3 to set Modulation Type (8) to ***FM***.
    - Press PM Soft Function Key F4 to set Modulation Type (8) to ***PM***.
  - Set Deviation/Modulation Level to required level. Normally, this is 1.0 kHz. With Modulation Type (8) set to ***FM***, range is 0.0 to 100 kHz. With Modulation Type (8) set to AM, range is 0% to 100%. With Modulation Type (8) set to PM, range is 0 to 10 Radians.

8. If AUDIO/DATA IN Meter Operation i required, select desired Meter as follows:

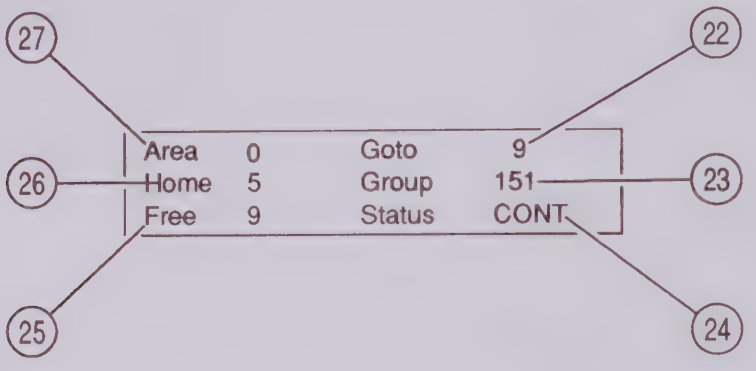
   If AUDIO/DATA IN Meter Operation is selected, Deviation Meter (15), AF Frequency Meter (14), and Distortion/DTMF Meter are deactivated.

- Press DIST Soft Function Key F1 to select Distortion Meter.
- Press SINAD Soft Function Key F2 to select SINAD Meter.
- Press AF LVL Soft Function Key F3 to select Audio Frequency Level.
- Press OFF Soft Function Key F4 to deactivate AUDIO/DATA IN Meter Operation.

9. If Distortion/DTMF Meter Operation is required, select desired Meter as follows:
   - Press DIST Soft Function Key F1 to select Distortion Meter Operation.
   - Press DTMF Soft Function Key F2 to select DTMF Decode Operation.
   - Press OFF Soft Function Key F3 to deactivate Distortion/DTMF Meter Operation.
10. Configure Deviation Meter (15) as follows:
    - Press DATA Soft Function Key F1 to measure deviation of Data signal.
    - Press VOICE Soft Function Key F2 to measure deviation of Voice signal.
    - Press FMZ Soft Function Key F3 to calibrate FM Detector.
    - Press FM CAL to compensate for transmitter error in Mobile Radio.
11. Select Input (19) for desired Input Connector. Selections include T/R (T/R Connector) and ANT (ANTENNA Connector). If Mobile Radio output is >0 dBm, select T/R. If ANT Input (19) is selected and Mobile Radio Output is >30 dBm, set Attenuation (20) for 30 dB. Select as follows:
    - Press T/R Soft Function Key F1 to select T/R Connector.
    - Press ANT Soft Function Key F2 to select ANTENNA Connector.
12. Set Attenuation (20). Selections include 0 dB and 30 dB. If ANT Input (19) is selected and Mobile Radio Output is >30 dBm, set Attenuation (20) for 30 dB. Select as follows:
    - Press 30 dB Soft Function Key F1 to set Attenuation (20) for ***30 dB***.
    - Press 0 dB Soft Function Key F2 to set Attenuation (20) for ***0 dB***.

B. LTR RADIO HANDSHAKE TEST

This test verifies that the COM-120B is able to link with the Mobile Radio and a proper encode/decode sequence is performed. Additional tests that can be performed simultaneously include RF Power Measurement, RF Error Measurement, Voice FM Deviation Measurement, Data FM Deviation Measurement, AF Frequency Measurement and Distortion Measurement.



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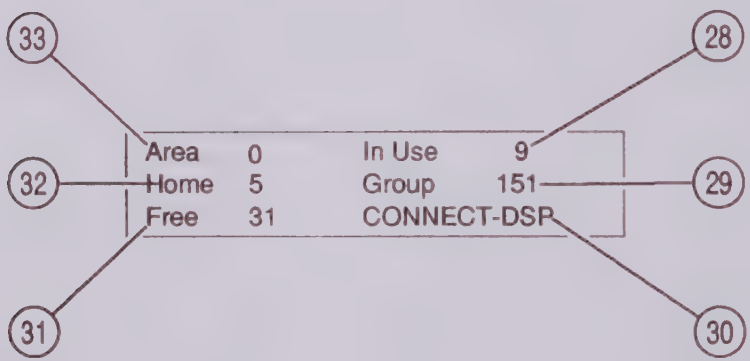

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1. Set Deviation Meter (15) to measure Voice or Data FM Deviation as needed.
2. Set Group (23) for ID Code of Mobile Radio.
3. Set Status (24) to ***FREE***.
4. Set Home (26) to Mobile Radio Home Repeater Number.
5. Set Area (27) for Mobile Radio Area switch setting.
6. Connect Mobile Radio RF Output to connector specified by Input (19).
7. Connect Mobile Radio RF Input to connector specified by Output (5).
8. Key Mobile Radio. Verify ***CONNECT-DSP*** or ***CONNECT-RIC*** is displayed for Radio Status (30).

9. Verify Group (29) matches Group (23).

10. Verify Home (32) and In Use (28) match Home (26).

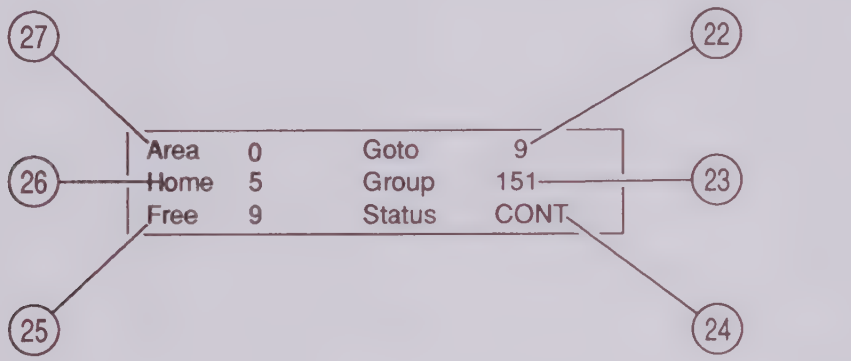
11. Verify Area (33) matches Area (27).

12. Verify Free (31) displays ***31***.

13. Unkey Mobile Radio. Verify Release is displayed for Radio Status (30). Verify In Use (28) displays ***31***.

C. LTR RADIO HANDOFF TEST

This test verifies that the COM-120B is able to link with the Mobile Radio and a proper Handoff to a free repeater is performed. Additional tests that can be performed simultaneously include RF Power Measurement, RF Error Measurement, Voice FM Deviation Measurement, Data FM Deviation Measurement, AF Frequency Measurement and Distortion Measurement.



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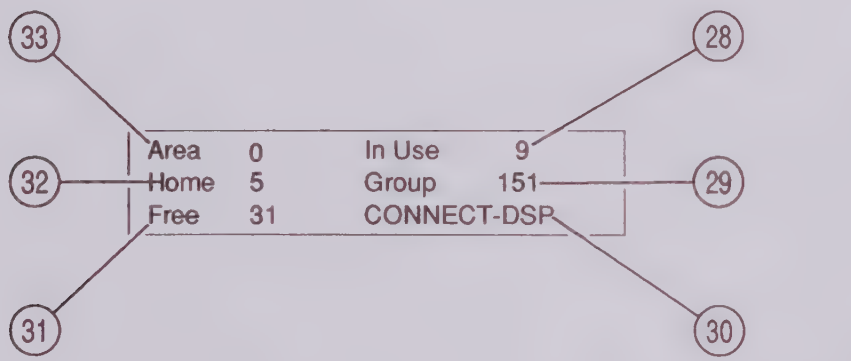

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1. Set Deviation Meter (15) to measure Voice or Data FM Deviation as needed.
2. Set Group (23) for ID Code of Mobile Radio.
3. Set Status (24) to ***BUSY***.
4. Set Free (25) for Mobile Radio Free Repeater Number.
5. Set Home (26) to Mobile Radio Home Repeater Number.
6. Set Area (27) for Mobile Radio Area switch setting.
7. Connect Mobile Radio RF Output to connector specified by Input (19).
8. Connect Mobile Radio RF Input to connector specified by Output (5).

9. Key Mobile Radio. Verify ***CONNECT-DSP*** or ***CONNECT-RIC*** is displayed for Radio Status (30).

10. Verify Group (29) matches Group (23).

11. Verify Home (32) matches Home (26).

12. Verify In Use (28) matches Free (25).

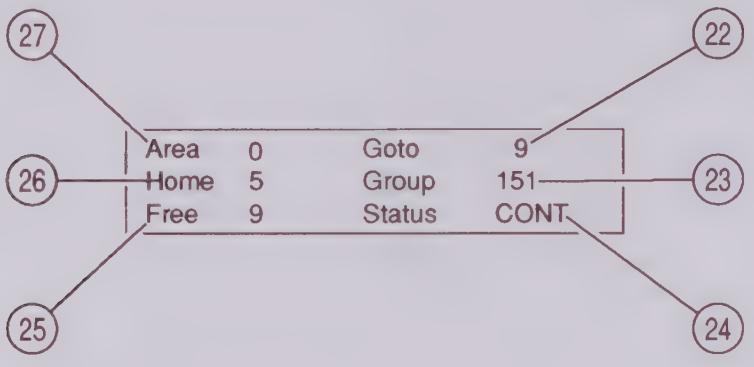
13. Verify Area (33) matches Area (27).

14. Verify Free (31) displays ***31***.

15. Unkey Mobile Radio. Verify Release is displayed for Radio Status (30). Verify In Use (28) displays ***31***.

D. LTR RADIO RECEIVE TEST

This test verifies that the COM-120B is able to link with the Mobile Radio and an audio modulated RF Signal transmitted by the COM-120B is received by the Mobile Radio. Additional tests that can be performed simultaneously include the AUDIO/DATA IN Meters to measure Distortion, SINAD and AF Level of the signal demodulated by the Mobile Radio.



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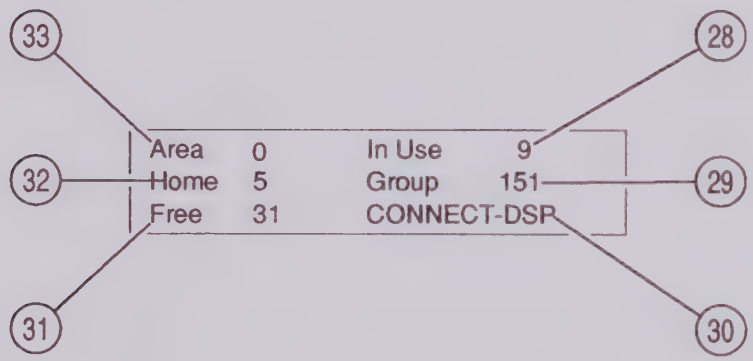

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1. If AUDIO/DATA IN Meters (12) are required, set following parameters:
   - Set Modulation Source for ***GEN1***.
   - Set Modulation Type (9) to ***FM***.
   - Set Deviation/Modulation Level for ***3.30 kHz***.
   - Set Frequency/Code Field for ***1000.0 Hz***.
2. Set Goto (22) to Home Repeater Number for Mobile Radio.
3. Set Group (23) for ID Code of Mobile Radio.
4. Set Status (24) to ***CONT***.
5. Set Home (26) to Mobile Radio Home Repeater Number.
6. Set Area (27) for Mobile Radio Area switch setting.

7. Connect Mobile Radio RF Output to connector specified by Input (19).

8. Connect Mobile Radio RF Input to connector specified by Output (5).

9. Connect Mobile Radio Audio Output to AUDIO/DATA IN Connector.

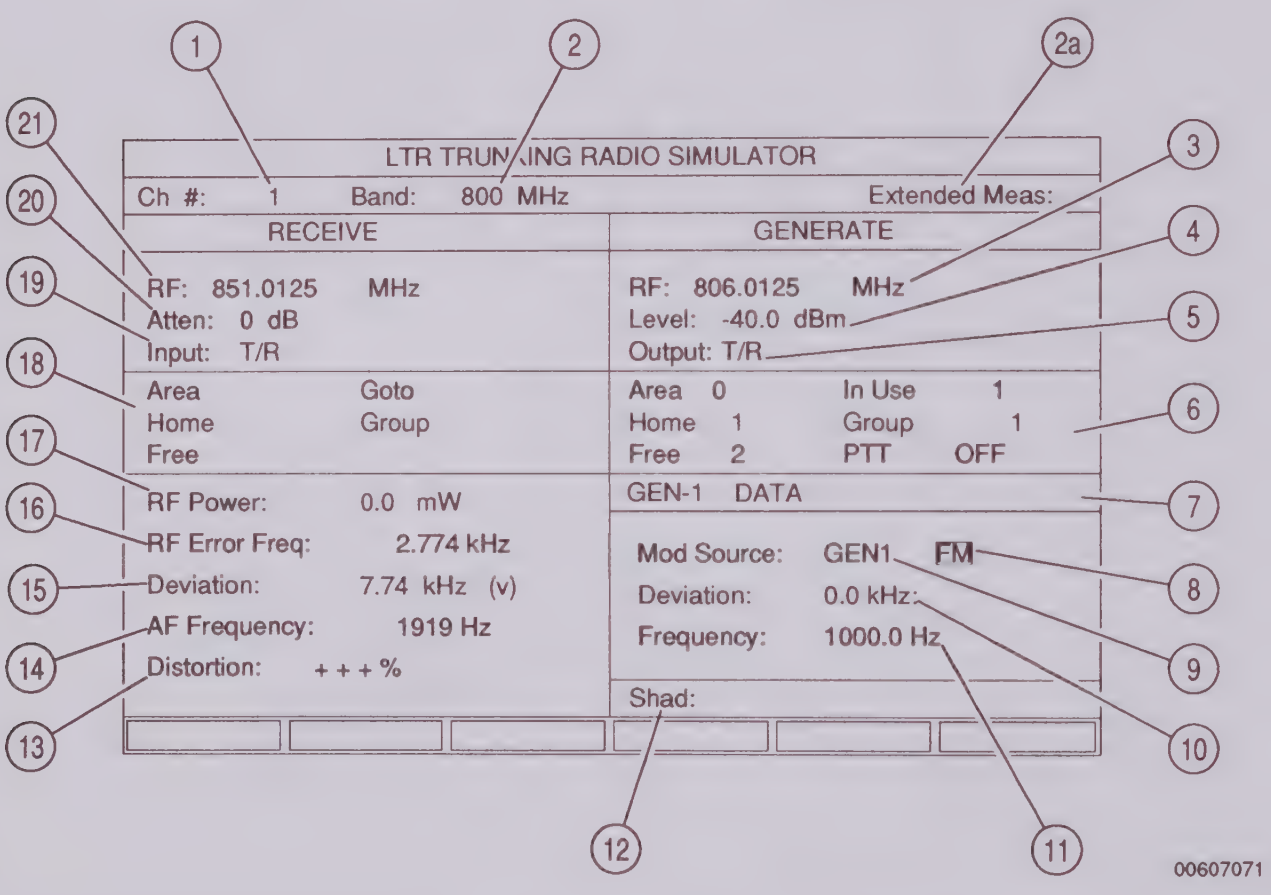
10. Verify 1000 kHz audio tone is audible.

11. Verify AUDIO/DATA IN Meter Measurement, if required.

7-12-8 RADIO SIMULATOR OPERATION

The Radio Simulator is used to test LTR Repeaters. To test LTR Repeaters, knowledge of the Radio Configuration Data, for the Mobile Radios that are serviced by the Repeater being tested, is required. This section is divided into paragraphs with the first paragraph being General Configuration and the remaining paragraphs being different tests. For each test, the General Configuration must be performed first.

A. LTR TRUNKING RADIO SIMULATOR GENERAL CONFIGURATION.



1. Configure Auxiliary Setup Screen (para 7-12-5).

2. From LTR Trunking Menu, select "1. Radio Simulation."

3. Enter Channel Number (1). Range is 1 to 760.

4. Choose Band Selection (2). Selections are 800 or 900 MHz. Select as follows:

   - Press 800 MHz Soft Function Key F1 to select 800 MHz Band.
   - Press 900 MHz Soft Function Key F2 to select 900 MHz Band.

5. Select Output (5) for COM-120B Generator. Selections are T/R (T/R Connector) or AUX (AUX RF OUT Connector). Select as follows:

- Press T/R Soft Function Key F1 to select T/R Connector.
- Press AUX Soft Function Key F2 to select AUX RF OUT Connector.

6. Set Level (4) to desired Output Level. Range for Output (5) set to T/R is -130 to -40 dBm. Range for Output (5) set to AUX is -130 to -13 dBm.

7. Activate Modulation Source (9) as required. If two (or more) sections of the RF Modulator are set in conflict (e.g. GEN1 set for PM and GEN2 set for FM, or GEN1 set for 0.01 kHz deviation and GEN2 set for 2.60 kHz deviation) then the screen shows the invalid source grayed out. Activate as follows:
   - Activate GEN1 as follows:
     - With cursor at Modulation Source (9), press GEN1 Soft Function Key F1.
     - Set Modulation Type (8) as follows:
       - Press OFF Soft Function Key F1 to set Modulation Type (8) to ***OFF***.
       - Press AM Soft Function Key F2 to set Modulation Type (8) to ***AM***.
       - Press FM Soft Function Key F3 to set Modulation Type (8) to ***FM***.
       - Press PM Soft Function Key F4 to set Modulation Type (8) to ***PM***.
     - Set Deviation/Modulation Level to required level. With Modulation Type (8) set to ***FM***, range is 0.00 to 100 kHz. With Modulation Type (8) set to AM, range is 0.0% to 100%. With Modulation Type (8) set to PM, range is 0.00 to 10 Radians.
     - Set Audio Frequency for Frequency/Code Field (11). Range is 0.0 to 20000.0 Hz.
   - Activate GEN2 as follows:
     - With cursor at Modulation Source (9), press GEN2 Soft Function Key F2.
     - Set Modulation Type (8) as follows:
       - Press OFF Soft Function Key F1 to set Modulation Type (8) to ***OFF***.
       - Press AM Soft Function Key F2 to set Modulation Type (8) to ***AM***.
       - Press FM Soft Function Key F3 to set Modulation Type (8) to ***FM***.
       - Press PM Soft Function Key F4 to set Modulation Type (8) to ***PM***.

- Set Deviation/Modulation Level to required level. With Modulation Type (8) set to ***FM***, range is 0.00 to 100 kHz. With Modulation Type (8) set to AM, range is 0.0% to 100%. With Modulation Type (8) set to PM, range is 0.00 to 10 Radians.

- Activate DTMF as follow:
  - With cursor at Modulation Source (9), press GEN1 Soft Function Key F1.
  - Set Modulation Type (8) as follows:
    - Press OFF Soft Function Key F1 to set Modulation Type (8) to ***OFF***.
    - Press AM Soft Function Key F2 to set Modulation Type (8) to ***AM***.
    - Press FM Soft Function Key F3 to set Modulation Type (8) to ***FM***.
    - Press PM Soft Function Key F4 to set Modulation Type (8) to ***PM***.
  - Set Deviation/Modulation Level to required level. With Modulation Type (8) set to ***FM***, range is 0.0 to 100 kHz. With Modulation Type (8) set to AM, range is 0% to 100%. With Modulation Type (8) set to PM, range is 0 to 10 Radians.
  - Enter Code for Frequency/Code Field (11).
- Activate DATA as follows:
  - With cursor at Modulation Source (9), press DATA Soft Function Key F4.
  - DATA Modulation Type (8) must be set to ***FM*** for the Radio Simulator to communicate with Repeaters, however, the field is editable. Set Modulation Type (8) as follows:
    - Press OFF Soft Function Key F1 to set Modulation Type (8) to ***OFF***.
    - Press AM Soft Function Key F2 to set Modulation Type (8) to ***AM***.
    - Press FM Soft Function Key F3 to set Modulation Type (8) to ***FM***.
    - Press PM Soft Function Key F4 to set Modulation Type (8) to ***PM***.
  - Set Deviation/Modulation Level to required level. Normally, this is 1.0 kHz. With Modulation Type (8) set to ***FM***, range is 0.0 to 100 kHz. With Modulation Type (8) set to AM, range is 0% to 100%. With Modulation Type (8) set to PM, range is 0 to 10 Radians.

8. If AUDIO/DATA IN Meter Operation is required, select desired Meter as follows:

   If AUDIO/DATA IN Meter Operation is selected, Deviation Meter (15), AF Frequency Meter (14) and Distortion/DTMF Meter are deactivated.

   - Press DIST Soft Function Key F1 to select Distortion Meter.
   - Press SINAD Soft Function Key F2 to select SINAD Meter.
   - Press AF LVL Soft Function Key F3 to select Audio Frequency Level.
   - Press OFF Soft Function Key F4 to deactivate AUDIO/DATA IN Meter Operation.

9. If Distortion Meter Operation is required, select as follows:

   - Press DIST Soft Function Key F1 to select Distortion Meter Operation.
   - Press OFF Soft Function Key F2 to deactivate Distortion/DTMF Meter Operation.

10. Configure Deviation Meter (15) as follows:

    - Press DATA Soft Function Key F1 to measure deviation of Data signal.
    - Press VOICE Soft Function Key F2 to measure deviation of Voice signal.
    - Press FMZ Soft Function Key F3 to calibrate FM Detector.
    - Press FM CAL to compensate for transmitter error in Repeater.

11. Select Input (19) for desired Input Connector. Selections include T/R (T/R Connector) and ANT (ANTENNA Connector). If Repeater output is >0 dBm, select T/R. If ANT Input (19) is selected and Repeater Output is >30 dBm, set Attenuation (20) for 30 dB. Select as follows:

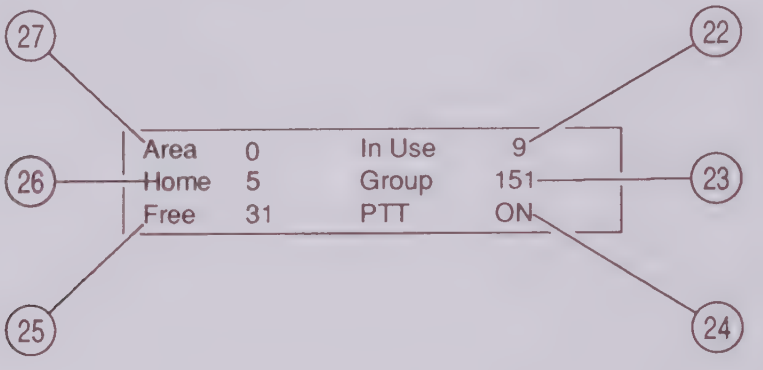
    - Press T/R Soft Function Key F1 to select T/R Connector.
    - Press ANT Soft Function Key F2 to select ANTENNA Connector.

12. Set Attenuation (20). Selections include 0 dB and 30 dB. If ANT Input (19) is selected and Repeater Output is >30 dBm, set Attenuation (20) for 30 dB. Select as follows:

    - Press 30 dB Soft Function Key F1 to set Attenuation (20) for ***30 dB***.
    - Press 0 dB Soft Function Key F2 to set Attenuation (20) for ***0 dB***.

B. LTR REPEATER HANDSHAKE TEST

This test verifies that the COM-120B is able to link with the Repeater and a proper encode/decode sequence is performed. Additional tests that can be performed simultaneously include RF Power Measurement, RF Error Measurement, Voice FM Deviation Measurement, Data FM Deviation Measurement, AF Frequency Measurement and Distortion Measurement.



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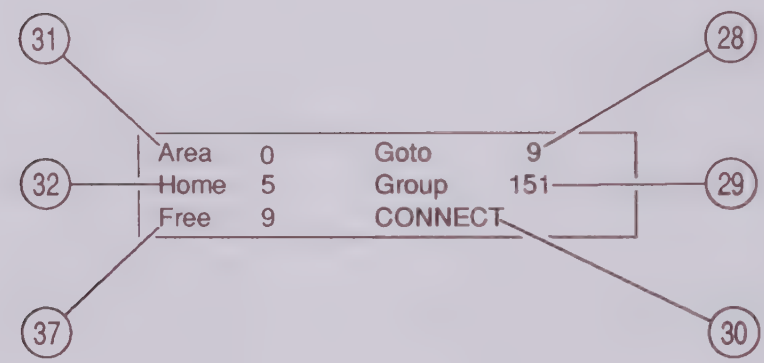

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1. Perform para 7-12-6(B). AUDIO/DATA IN Meters (12) are not used with this test. Set Deviation Meter (15) to measure Voice or Data FM Deviation as needed.

2. Set Group (23) for ID Code of Mobile Radio being simulated.

4. Set In Use (22) and Home (26) to Repeater Number.

5. Set Area (27) for simulated Mobile Radio Area switch setting.

6. Connect Repeater RF Output to connector specified by Input (19).

7. Connect Mobile Radio RF Input to connector specified by Output (5).

8. Press START/STOP CONTROL Key. Verify ***CONNECT*** is displayed for Repeater Status (30).

9. Verify Group (29) matches Group (23).

10. Verify Home (32) and Goto (28) matches Home (26).

11. Verify Area (33) matches Area (27).

12. Verify Free (31) displays Free Repeater Number for Simulated Mobile Radio.

7-13 AMPS CELLULAR TESTING (OPTION 15)

The AMPS Cell Site Simulator is Option 15 of the COM-120B and is used to test AMPS Mobile Telephone Equipment. This option is accessed by pressing SPCL Test Mode Key and selecting "2. Cellular."

7-13-1 AMPS CELL SITE SIMULATOR SETUP

The COM-120B is set up for AMPS Mobile Phone testing by the following procedure:

1. Press SPCL Mode Key. Select "2. Cellular" from the Options Menu.

2. Rotate SQUELCH Control ccw until squelch is set to minimum.

3. Rotate VOLUME Control fully ccw and then cw, until static becomes audible.

4. Rotate SQUELCH Control cw, slowly, until static is no longer audible.

   NOTE: If "data parity error" message is displayed during test operation, squelch setting may be to low.

   Squelch levels higher than necessary can prevent AMPS testing from functioning.

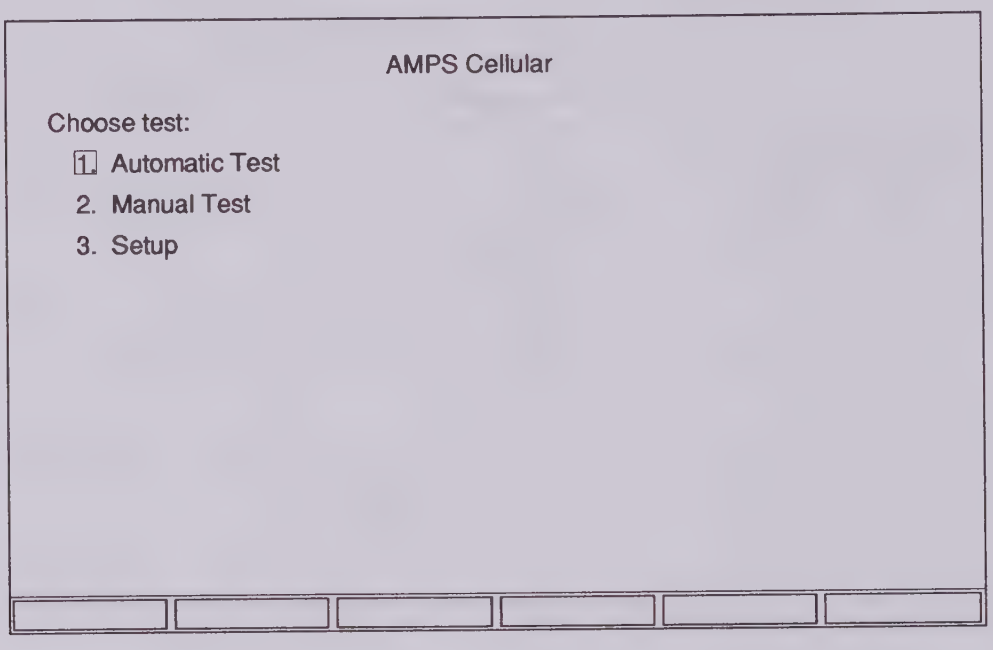
5. Connect T/R Connector to Output Connector of Mobile Phone.

6. Turn Mobile Phone power on.

7. To perform Audio Test, connect demodulated audio output connector of Mobile Phone to AUDIO/DATA IN Connector.

7-13-2 AMPS CELL SITE SIMULATOR MAIN AND SETUP MENUS

Accessing "2. Cellular" from the Options Menu accesses the AMPS Cellular Menu. The Automatic Test and Manual Test and Setup Screens are selected from this Menu.



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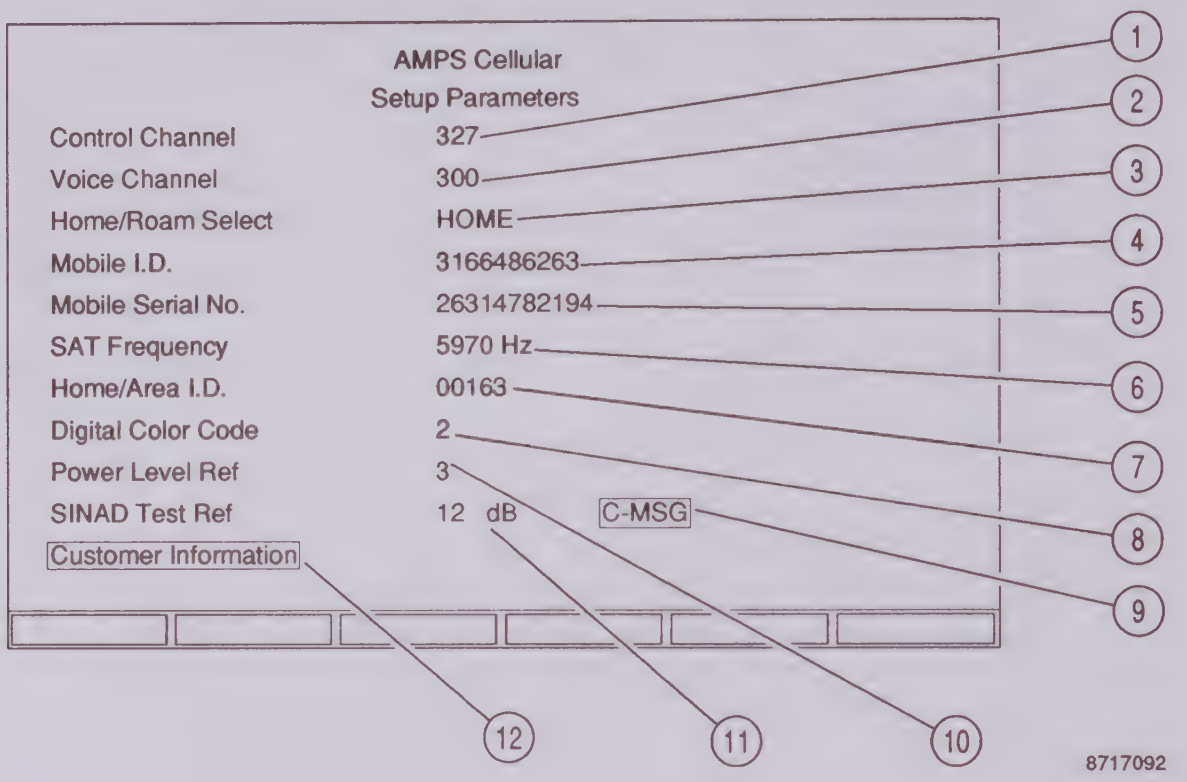
The parameters used for the Automatic and Manual Tests are selected through the AMPS Setup Screen. The AMPS Setup Menu is divided into 2 screens: Pages 1 and 2. Access "3. Setup" from the AMPS Cellular Menu to display Page 1 of the AMPS Setup Screen. Following is a listing of the AMPS Setup parameters, their uses and ranges.



1. Control Channel

Selects simulated Control Channel. Range is 1 to 1023. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available with this function include:

F5 PG DN
Selects Page 2 of AMPS Setup Screen.

F6 RETURN
Returns operation to AMPS Cellular Menu.

2. Voice Channel

Selects simulated Voice Channel. Range is 1 to 1023. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available with this function include:

F5 PG DN
Selects Page 2 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

3. Home/Roam Select

Selects simulated Home or Roaming Registration. Selections are Home or Roam.

Soft Function Keys available with this function include:

F1 HOME
Selects simulated Home Registration.

F2 ROAM
Selects simulated Roaming Registration.

F5 PG DN
Selects Page 2 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

4. Mobile I.D.

Selects the Mobile Identification Number (MIN) used to identify Mobile Phone. Maximum length is 10 characters using A to D, 0 to 9, and # character. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Performing Registration Test automatically enters MIN of Mobile Phone.

Soft Function Keys available with this function include:

F1 CLEAR
Clears current entry.

F5 PG DN
Selects Page 2 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

5. Mobile Serial No.

Selects Electronic Serial Number (ESN) used to identify Mobile Phone. Length is 11 digits. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available with this function include:

F1 CLEAR
Clears current entry.

F5 PG DN
Selects Page 2 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

6. SAT Frequency

Selects SAT Frequency simulated. Selections include 5970, 6000 or 6030 Hz.

Soft Function Keys available with this function include:

F1 5970 Hz
Selects 5970 Hz SAT Frequency.

F2 6000 Hz
Selects 6000 Hz SAT Frequency.

F3 6030 Hz
Selects 6030 Hz SAT Frequency.

F5 PG DN
Selects Page 2 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

7. Home/Area I.D.

Selects System Identification Number (SID) used to test Home System Identification of Mobile Phone. Length is 5 digits. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available with this function include:

F1 CLEAR
Clears current entry.

F5 PG DN
Selects Page 2 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

8. Digital Color Code

Selects Digital Color Code (DCC) simulated. Range is 0 to 3. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available with this function include:

F5 PG DN
Selects Page 2 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

9. Audio Test Filter

Displays Audio Filter setting for SINAD Test. Selections include C-MSG (C-Message Weighted Bandpass Filter) and 20 kHz Low-Pass Filter.

Soft Function Keys available with this function include:

F3 C-MSG
Selects C-Message Weighted Bandpass Filter for Audio Test Filter.

F4 20 kHz
Selects 20 kHz Low-Pass Filter for Audio Test Filter.

F5 PG DN
Selects Page 2 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

10. Power Level Ref

Mobile Phone Power Level used when Mobile Phone power readings are taken. Range is 0 to 7. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available with this function include:

F5 PG DN
Selects Page 2 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

11. SINAD Test Ref

Selects Pass/Fail SINAD Test Reference. Range is 3 to 40 dB. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available with this function include:

F5 PG DN
Selects Page 2 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

12. Customer Information

Displays Customer Information Menu. Edit Customer Information using DATA ENTRY Keys. Press ENTER Key to complete edit. Customer Information is printed out on Automatic Test Printout. Submenu Fields are as follows:

Customer Name	Customer I.D.
Manufacturer	Model
Serial Number	Type Approval
Certificate	

Soft Function Keys available at Prompt include:

F1 INFO
Accesses Customer Information Menu.

F5 PG DN
Selects Page 2 of AMPS Setup Screen.

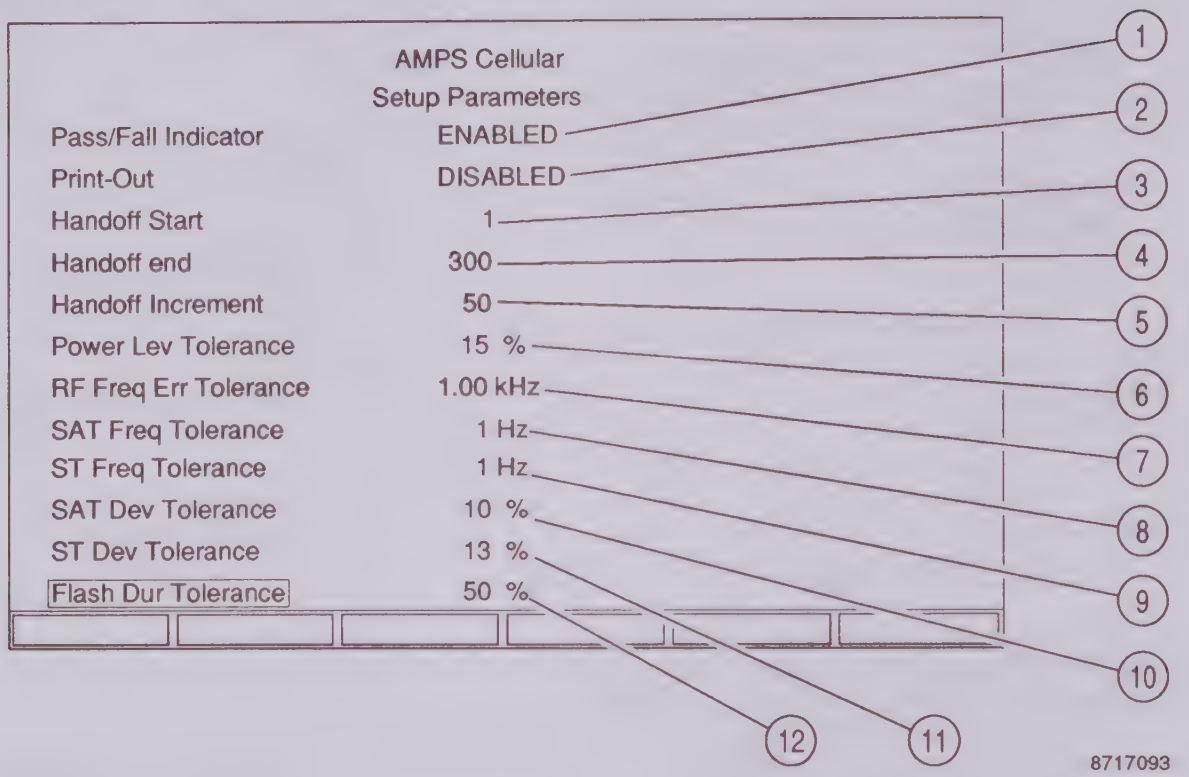
F6 RETURN
Returns Operation to AMPS Cellular Menu.

Soft Function Keys available from Customer Information Menu include:

F1 CLEAR
Clears entry in currently selected field.

F6 RETURN
Returns Operation to AMPS Setup Menu.

Pressing "Page 2" Soft Function Key F1 displays Page 2 of the AMPS Setup Menu.



1. Pass/Fail Indicator

Displays status of Pass/Fail Indicator on Automatic Test Printout. Displays ENABLED or DISABLED.

Soft Function Keys available with this function include:

F1 DISABLED
Disables Pass/Fail Indicator from appearing on Automatic Test Printout.

F2 ENABLED
Enables Pass/Fail Indicator to appear on Automatic Test Printout.

F5 PG UP
Selects Page 1 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

2. Print-Out

Enables or disables print-out of Automatic Test Output. Requires printer connection to RS-232 Connector. Refer to Section 5 for configuring RS-232 Connector.

Soft Function Keys available with this function include:

F1 DISABLED
Disables Automatic Test Printout.

F2 ENABLED
Enables Automatic Test Printout.

F5 PG UP
Selects Page 1 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

3. Handoff Start

First channel of Handoff Test sequence. Handoff Test starts with Handoff Start channel, increases by Handoff Increment (5), performing Handoff Test at each channel and ends with Handoff End (4) channel. Range is 1 to 1023. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available with this function include:

F5 PG UP
Selects Page 1 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

4. Handoff End

Last channel of Handoff Test sequence. Handoff Test starts with Handoff Start (3) channel, increments by the Handoff Increment (5) performing Handoff Test at each channel and ends with Handoff End channel. Range is 1 to 1023. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available with this function include:

F5 PG UP
Selects Page 1 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

5. Handoff Increment

Increment Number for Handoff Test. Handoff Test starts with Handoff Start (3) channel, increments by Handoff Increment, performing Handoff Test at each channel and ends with the Handoff End (4) channel. Range is 1 to 1023. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available with this function include:

F5 PG UP
Selects Page 1 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

6. Power Lev Tolerance

Selects tolerance used for Power Level Test. Consists of two editable fields: Positive Tolerance and Negative Tolerance. Range for both fields is from 0% to 99% or 0 to 99 dB. For each field, select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available with this function include:

F4 dB/%
Toggles between settings. Inactive units are displayed.

F5 PG UP
Selects Page 1 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

7. RF Freq Err Tolerance

Selects tolerance for RF Frequency Error measurements. Range is 0.00 to 9.99 kHz. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available with this function include:

F5 PG UP
Selects Page 1 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

8. SAT Freq Tolerance

Selects tolerance for SAT Frequency measurements. Range is 0 to 99 Hz. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available with this function include:

F5 PG UP
Selects Page 1 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

9. ST Freq Tolerance

Selects tolerance for Signal Tone (ST) Frequency Test. Range is 0 to 999 Hz. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available with this function include:

F5 PG UP
Selects Page 1 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

10. SAT Dev Tolerance

Selects tolerance for SAT Deviation measurements. Range is 0% to 99%. Select using DATA ENTRY Keys. Press ENTER Key to complete edit.

Soft Function Keys available with this function include:

F5 PG UP
Selects Page 1 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

11. ST Dev Tolerance

Selects the tolerance used to determine if the Signal Tone (ST) Deviation Test passes or fails. Range is from 0% to 99%. To set, move cursor to "11. ST Dev Tolerance" and press ENTER Key. Use DATA

ENTRY Keypad (29) to enter a tolerance and press ENTER Key.

Soft Function Keys available with this function include:

F5 PG UP
Selects Page 1 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

12. Flash Dur Tolerance

Selects the tolerance used to determine if the Flash Hook Duration Test passes or fails. Range is from 0% to 99%. To set, move cursor to "12. Flash Dur Tolerance" and press ENTER Key. Use DATA ENTRY Keypad (29) to enter a tolerance and press ENTER Key.

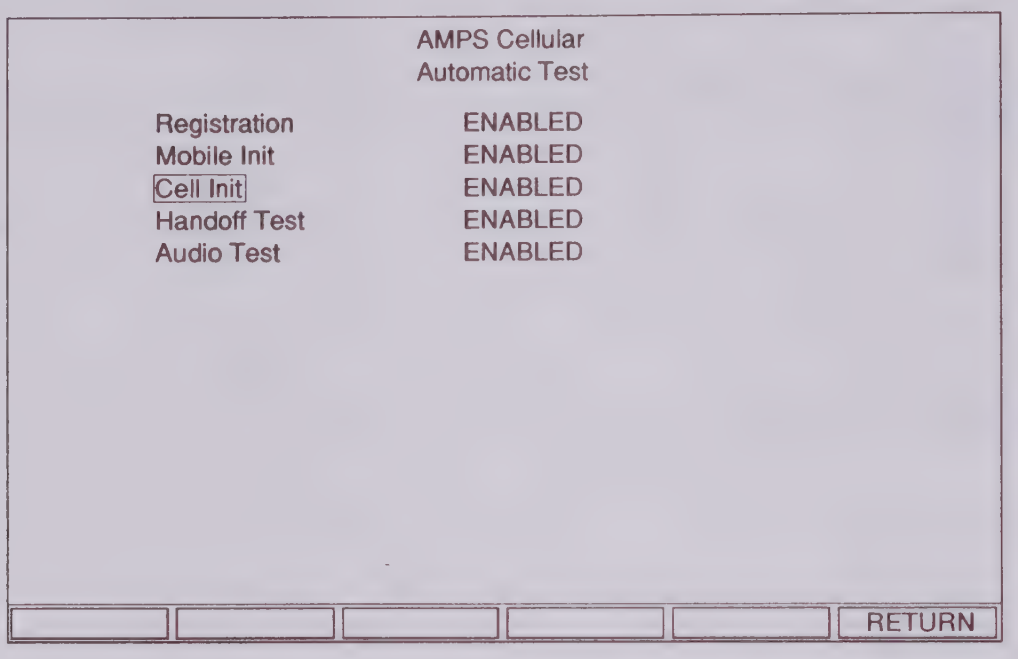
Soft Function Keys available with this function include:

F5 PG UP
Selects Page 1 of AMPS Setup Screen.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

7-13-3 AMPS CELL SITE SIMULATOR AUTOMATIC TESTS

The AMPS Automatic Test Screen is accessed by selecting "1. Automatic Test" from the AMPS Cellular Menu.



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Tests listed on the AMPS Automatic Test Screen can be performed individually or in any combination except Mobile Init or Cell Init Test must be performed if Handoff Test or Audio Test is desired. Tests to be performed are listed as ENABLED. Tests that are not to be performed are DISABLED. Each of the AMPS Automatic Test Screens are listed in the following paragraphs. The descriptions of the tests and results assume the mobile test was performed with all tests ENABLED.

Soft Function Keys of the AMPS Automatic Test Screen prior to performing tests are as follows:

F1 DISABLED
Sets test at current cursor location to DISABLED.

F2 ENABLED
Sets test at current cursor location to ENABLED.

F3 START
Starts tests that are ENABLED.

F6 RETURN/ABORT
With RETURN displayed, returns operation to AMPS Cellular Menu. With ABORT displayed, stops current test and reports test as FAILED.

Soft Function Keys of the AMPS Automatic Test Screen after performing tests are as follows:

F1 RESET
Resets AMPS Automatic Test to initial conditions.

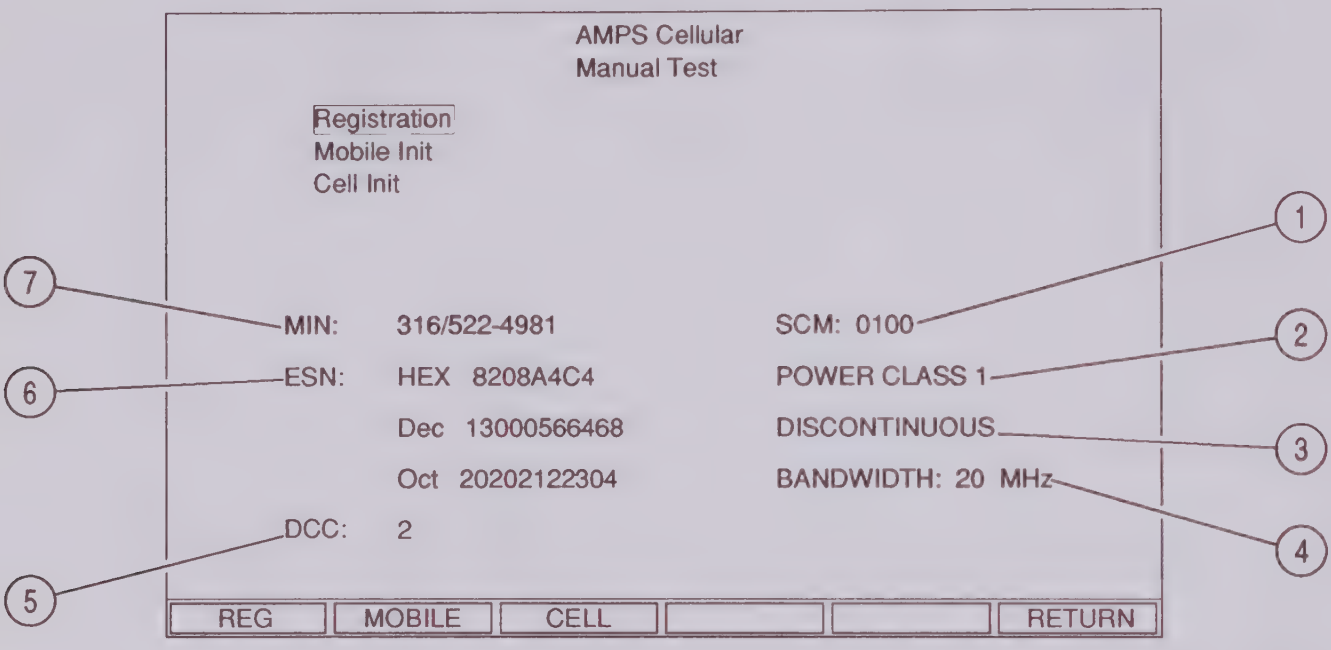
F2 RESULTS
Pages through AMPS Automatic Test results.

F3 START
Starts tests that are ENABLED.

F6 RETURN
Returns operation to AMPS Cellular Menu.

A. REGISTRATION TEST

The Registration Test sends a Registration order to the Mobile Phone and displays the registration parameters of the Mobile Phone tested. To perform the Registration Test, verify ENABLED appears beside Registration Prompt and press START Soft Function Key F3. After the Registration Tests are completed the following results appear:



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1. SCM

   Displays 4 least significant Station Class Mark bits.

2. Power Class

   Displays Power Class of Mobile Phone under test.

3. Transmission State

   Displays Transmission State, Continuous or Discontinuous, of Mobile Phone under test.

4. Bandwidth

   Displays bandwidth of Mobile Phone under test. 20 MHz allows channels 1 to 666. 25 MHz allows channels 1 to 1023.

5. DCC

   Displays Digital Color Code last received by Mobile Phone under test.

6. ESN

   Displays Electronic Serial Number of Mobile Phone under test in Hexadecimal, Decimal and Octal.

7. MIN

   Displays Mobile Identification Number of Mobile Phone under test.

B. MOBILE INIT TEST

The Mobile Init (Initiated) Test requires a call to be initiated from the Mobile Phone. The following procedure performs the Mobile Init Test:

1. With cursor on Mobile Init, press ENABLED Soft Function Key F2. Press START Soft Function Key F3 to start test.

2. "Place Call" prompt appears. Place call using Mobile Phone under test.

3. "Enter Digits" prompt appears. Enter up to 16 digits using Mobile Phone to test DTMF transmission. Pressing Cont Soft Function Key F1 continues Mobile Init Test with or without digits entered.

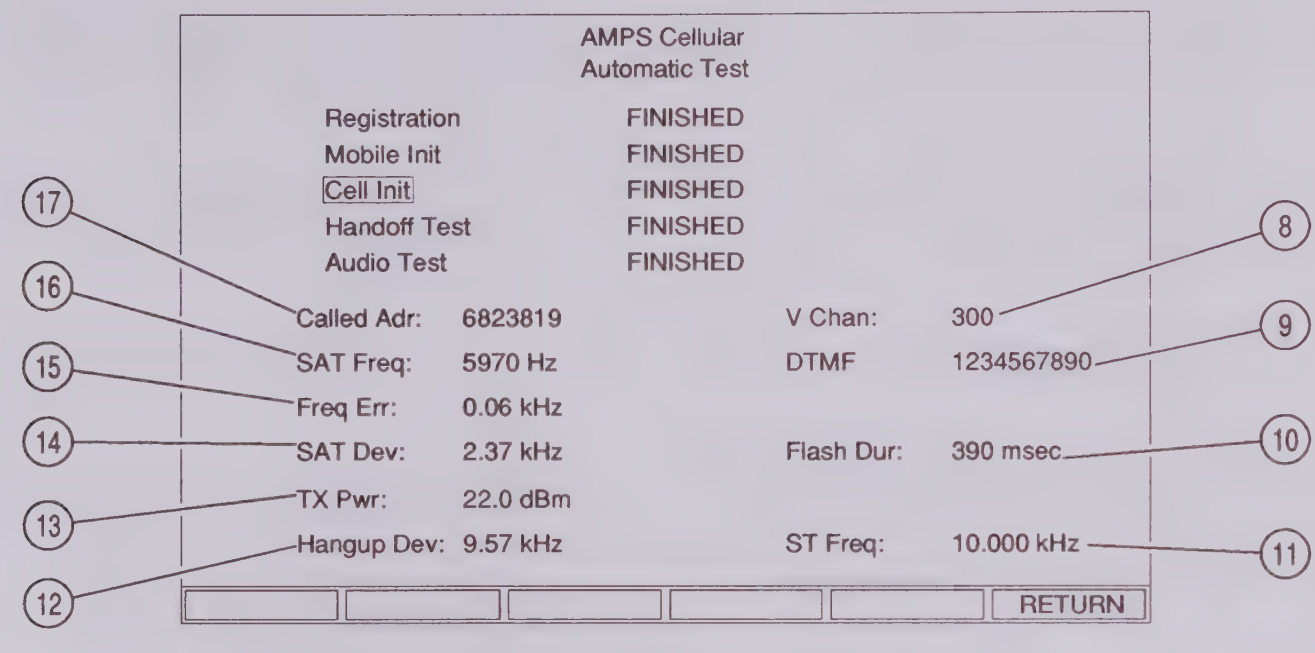
4. "Press Flash Hook" prompt appears. Send Flash Hook signal using Mobile Phone. Pressing Cont Soft Function Key F1 continues Mobile Init Test without testing Flash Hook message.

5. "Measuring Frequency" message appears indicating Maintenance Order is sent to the Mobile Phone for measuring Signal Tone frequency.

6. "Press Flash Hook" prompt appears. Send Flash Hook signal using Mobile Phone.

7. "Hangup Phone" prompt appears. Hang up Mobile Phone or press Release Soft Function Key F5 for release order to be sent to Mobile Phone. When "Hangup Phone" prompt disappears, Mobile Init Test is finished.

Power Level Test is performed with the Mobile Init Test. After testing is finished, press Results Soft Function Key F2 to page through results. Mobile Init Test results are as follows:



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8. V Chan

Displays Voice Channel designated to Mobile Phone by Test Set.

9. DTMF

Displays DTMF digits transmitted after "ENTER DIGITS" prompt appeared.

10. Flash Dur

Displays Flash Hook signal time duration transmitted by Mobile Phone under test.

11. ST Freq

Displays frequency of Signal Tone transmitted by Mobile Phone under test.

12. Hangup Dev

Displays deviation of hang up signal of Mobile Phone under test.

13. TX Pwr

Displays Mobile Phone Output Power. Mobile Phone is set to Power Level selected as Power Level Reference in AMPS Setup Menu.

14. SAT Dev

Displays deviation of SAT transmitted by Mobile Phone under test.

15. Freq Err

Displays error of Reverse Voice Channel Frequency received from Mobile Phone.

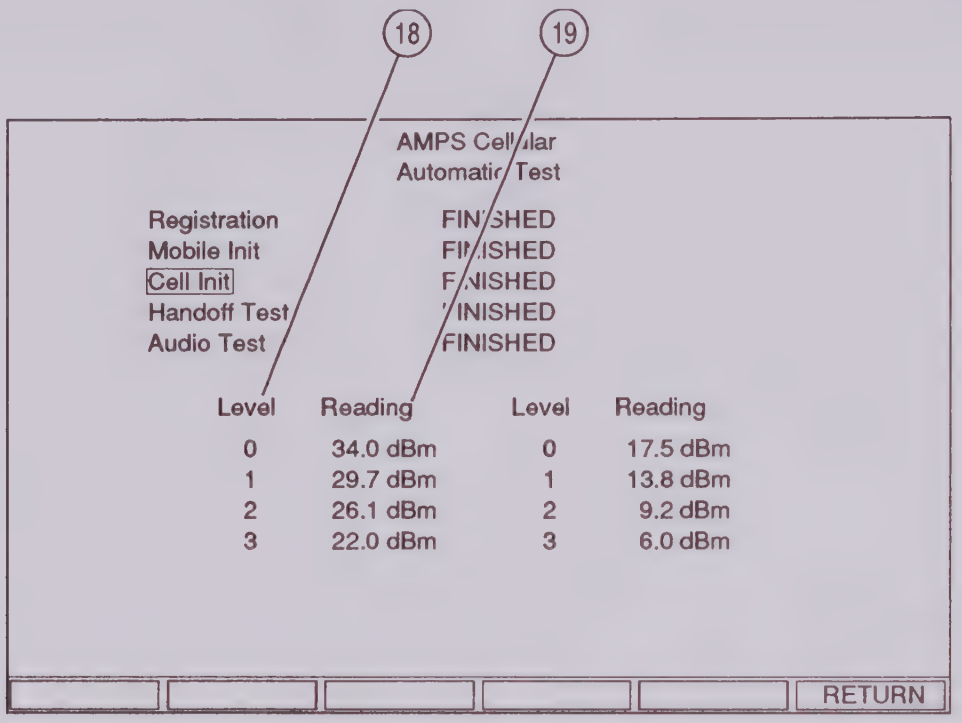
16. SAT Freq

Displays SAT frequency transmitted by Mobile Phone under test.

17. Called Adr

Displays phone number transmitted by Mobile Phone under test.

The Power Level Test sends the VMAC values 0 to 7 to the Mobile Phone and the output power is measured. The Power Level Test results appears as follows:



18. Level

Displays power levels of Mobile Phone.

19. Reading

Displays power readings of Mobile Phone for each power level.

C. CELL INIT

The Cell Init (Cell Site Initiated) Test simulates a call from the Cell Site. The following procedure performs the Cell Init Test:

1. With cursor on Cell Init, press ENABLED Soft Function Key F2. Press START Soft Function Key F3 to start test.

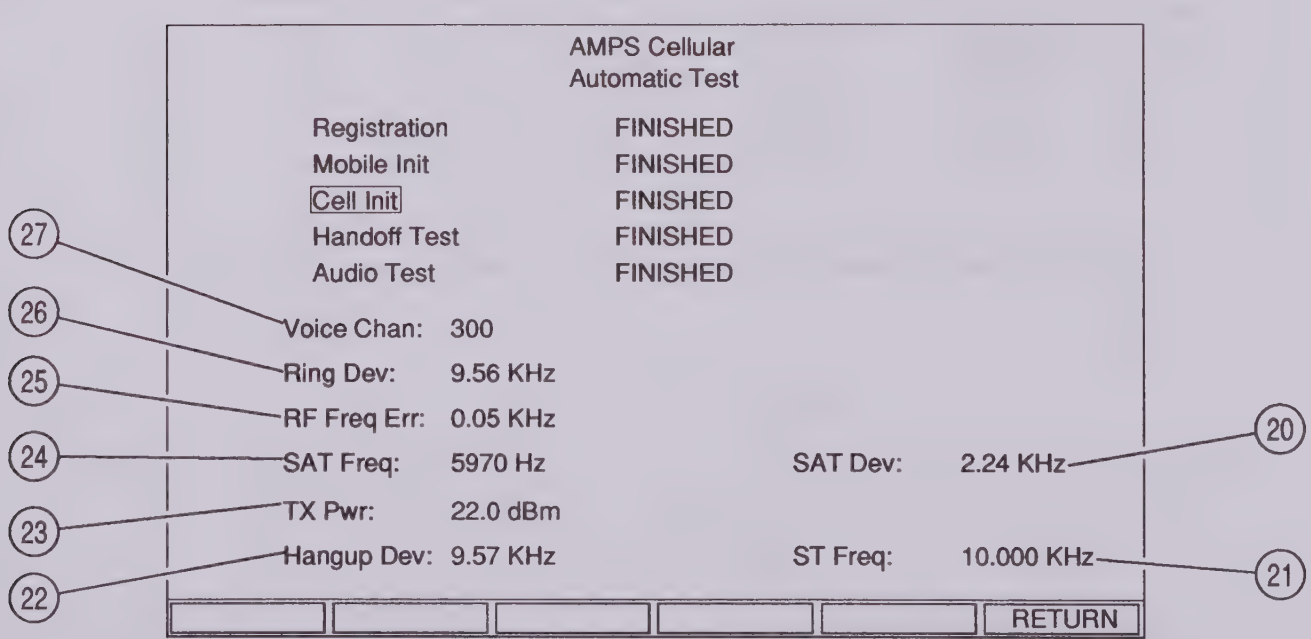
2. "Paging Mobile", "Page Answered" and "Ringing Mobile" messages appear as Test Set performs test.

3. "Answer Phone" prompt appears. Answer call placed to Mobile Phone.

4. "Measuring Frequency" message appears indicating Maintenance Order is sent to the Mobile Phone for measuring Signal Tone frequency.

5. If Maintenance Order does not fail, "Press Flash Hook" prompt appears. Press Flash Hook on Mobile Phone. "Hangup Phone" prompt appears. Hanging up Mobile Phone completes Cell Init Test.

   A Power Level Test is also performed with the Cell Init Test. Refer to para 7-13-3B for Power Level Test information. After the Cell Init Test is finished, press "Results" Soft Function Key F2 to page through the following Cell Init Test results:



8717121

20. SAT Dev

Displays SAT Deviation received from Mobile Phone.

21. ST Freq

Displays Signal Tone (Hang Up) Frequency received from Mobile Phone.

22. Hangup Dev

Displays Signal Tone (Hang Up) Deviation received from Mobile Phone.

23. TX Pwr

Displays Mobile Phone Output Power. Mobile Phone is set to Power Level selected as Power Level Reference in AMPS Setup Menu.

24. SAT Freq

Displays SAT Frequency received from Mobile Phone.

25. RF Freq Err

Displays error of Reverse Voice Channel Frequency received from Mobile Phone.

26. Ring Dev

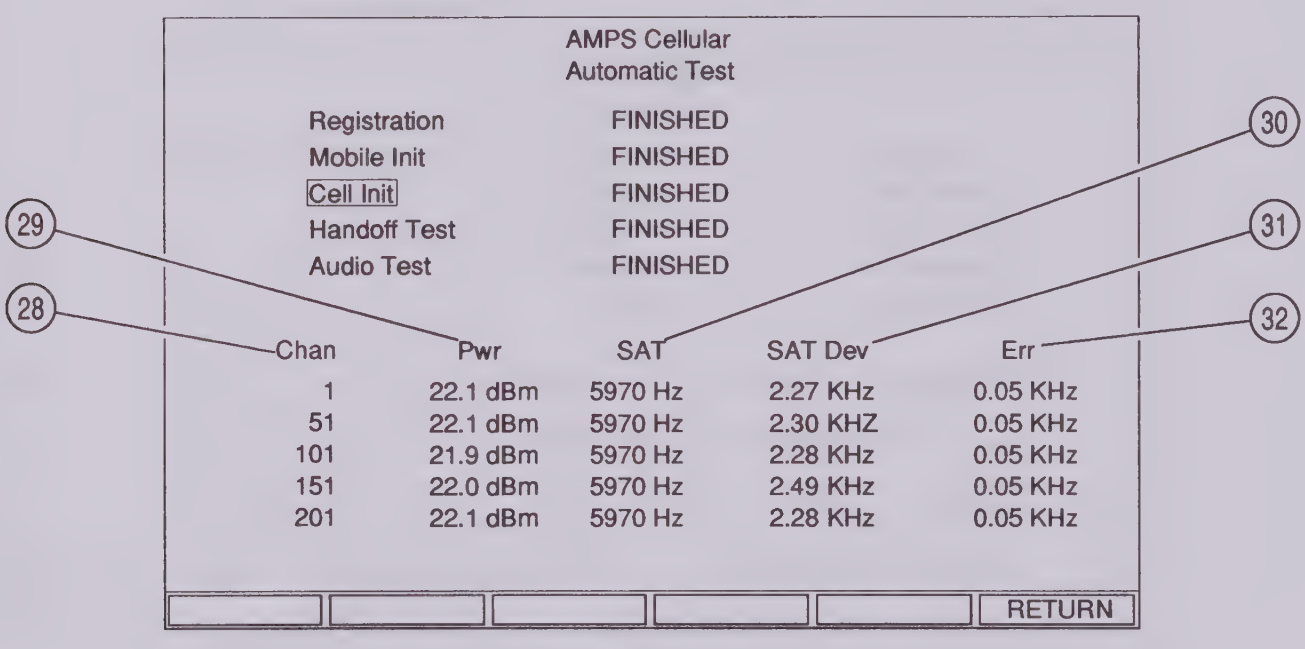
Displays Signal Tone Deviation received from Mobile Phone in response to Page order.

27. Voice Chan

Displays Voice Channel designated to Mobile Phone by Test Set.

D. HANDOFF TEST

The Handoff Test performs a series of handoffs to different Channels. The first handoff is to the Handoff Start Channel. Following handoffs are to the channel found by adding the Handoff Increment to the current Channel until the Handoff End Channel receives a handoff. To perform this test, press ENABLED Soft Function Key F2, while cursor is on Handoff Test. Press START Soft Function Key F3 to start test. The Handoff Test cannot be selected unless the Mobile Init Test or the Cell Init Test is selected.



8717119

28. SAT

Displays SAT Frequency received from Mobile Phone.

29. SAT Dev

Displays SAT Deviation received from Mobile Phone.

30. Err

Displays RF Frequency Error of Reverse Voice Channel.

31. Chan

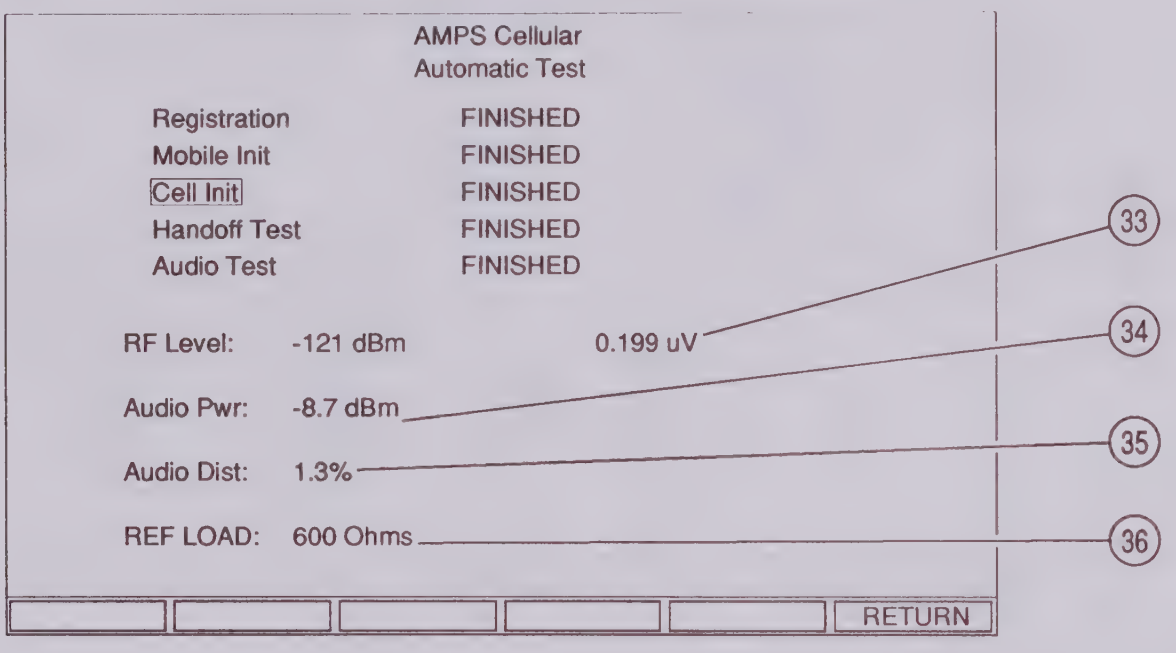
Displays Voice Channel which the handoff was made.

32. Pwr

Displays Mobile Phone Output Power. Mobile Phone is set to Power Level selected as Power Level Reference in AMPS Setup Menu.

E. AUDIO TEST

The Audio Test measures Audio Distortion, Audio Power and RF Input Power required to maintain a SINAD Level. Requires Phone Audio Out be connected to AUDIO/DATA IN Connector. The SINAD Test Reference is set from the AMPS Setup Menu. To perform this test, press ENABLED Soft Function Key F2, while cursor is on Audio Test. Press START Soft Function Key F3 to start test. If Test is not desired, press SKIP Soft Function Key FX, when prompted by Test Set. The Audio Test cannot be performed unless the Mobile Init Test or the Cell Init Test is also performed.



8717120

33. RF Level

Displays RF Input Level, in dBm and volts, which produces SINAD reading equal to SINAD Test Reference.

34. Audio Pwr

Displays Mobile Phone Audio Power.

35. Audio Dist

Displays Mobile Phone Audio Distortion.

36. REF LOAD

Displays Load Reference for Audio Test.

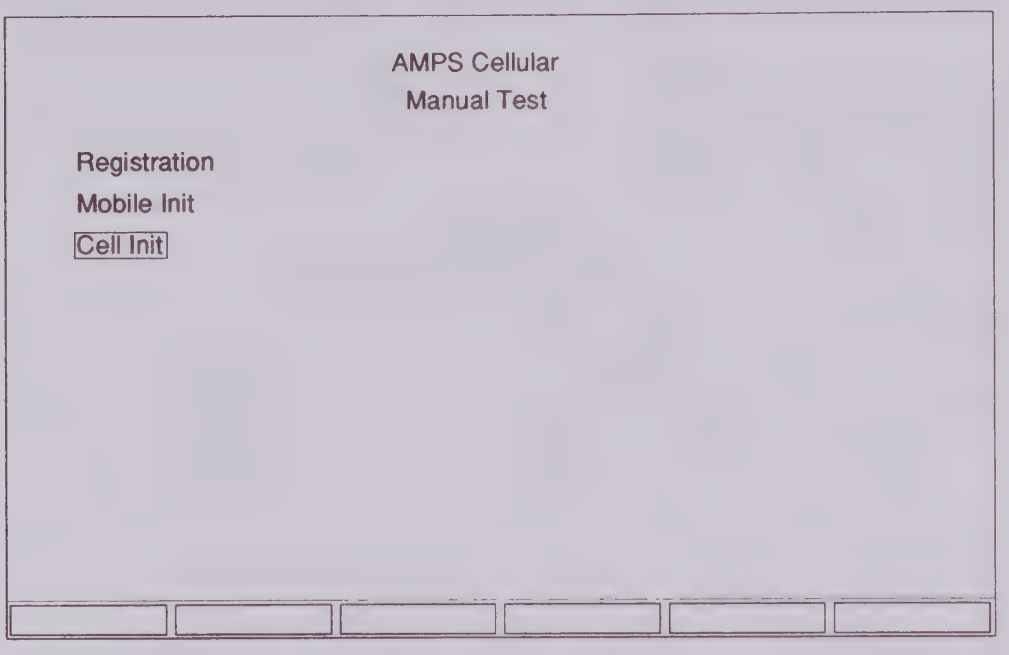
F. AUTOMATIC TEST PRINTOUT

If "2. Print-Out" is enabled on Page 2 of the AMPS Setup Menu, the performed test results are printed on a device connected to the RS-232 Connector. A Printout for all Automatic Tests is shown here. Test readings are followed by P (Pass) or F (Fail) to indicate the test passed or failed.

```
************************************************************ **************

************ IFR COM-120B AMPS CELLULAR MOBILE AUTO TEST ************
   DATE: FEB-24-1993
   CUST:                    CUST ID: 5438
   MANUFACTURER: IFR Engineering
   MODEL: Type 2              SERIAL #: 1234567890
   TYPE APPROVAL:0987654321       CERTIFICATE: 123abc456DEF
************************************************************ **********

  MOBILE ID NUMBER (MIN): 316/522-4981
  ELECTRONIC SERIAL NUMBER (ESN): HEX:  8208A4C4
                      DEC:  13000566468
                      OCT:  20202122304
  MOBILE STATION CLASS: 0100
                  POWER: POWER CLASS I
            TRANSMISSION: DISCONTINUOUS
            BANDWIDTH: 20 MHZ
  DIGITAL COLOR CODE: 3
  HOME ID (SID): 00163    HOME
  SAT: 5970 Hz
*********************** MOBILE INITIATED CALL ************************
 CALLED ADDRESS: 6955895452
  VOICE CHANNEL: 300          FREQ FWD/FREQ RVS: 879.0000/834.0000
  FREQ ERROR: 0.026 kHz   P
  SAT FREQ: 5970 Hz  P         SAT DEV: 2.26 kHz   F
  MOBILE TX POWER: 5.9 dBm   P
  DTMF RESPONSE: 123456789*0#
  FLASH HOOK DURATION: 100 mS   F
************************** POWER LEVEL TEST **************************
    LEVEL       READING
      0        33.8 dBm   P
      1        29.4 dBm   P
      2        25.8 dBm   P
      3        21.8 dBm   P
      4        17.2 dBm   P
      5        13.5 dBm   P
      6         9.1 dBm   P
      7         5.9 dBm   P
***************************** HAND-OFF TEST ****************************
    VOICE      RF        SAT        SAT        RF FREQ
   CHANNEL     PWR       FREQ    DEVIATION       ERROR
     51      6.0 dBm    5970 Hz  *2.24 kHz     0.020 kHz   F
    101      5.5 dBm    5970 Hz  *2.22 kHz     0.020 kHz   F
    151      5.7 dBm    5970 Hz  *2.24 kHz     0.020 kHz   F
    201      6.0 dBm    5970 Hz  *2.23 kHz     0.019 kHz   F
    251      6.0 dBm    5970 Hz  *2.24 kHz     0.016 kHz   F
********************** SINAD TEST AT REF 12 dB **********************
  RF LEVEL: -119 dBm          0.250 uV
  AUDIO POWER: -54.0 dBm        REF LOAD: 600 Ohms
  AUDIO DISTORTION: 1.0 %
************************* CELL INITIATED CALL ************************
  VOICE CHANNEL: 300
  RING PLUS SAT DEVIATION: 9.48 kHz   P
  RF FREQ ERROR: 0.006 kHz   P
  SAT FREQ: 5970 Hz   P
  SAT DEV: 2.24 kHz   F
  TX POWER: 5.7 dBm   P
  HANGUP (ST) PLUS SAT DEVIATION: 9.56 kHz   P
  ST FREQUENCY: 10.000 kHz   P
```

7-13-4 AMPS CELL SITE SIMULATOR MANUAL TESTS

The AMPS Manual Test Screen is accessed by selecting "2. Manual Test" from the AMPS Cellular Menu.



8717091

Soft Function Keys available with the AMPS Manual Test Screen include:

F1 REG
Initiates Manual Registration Test.

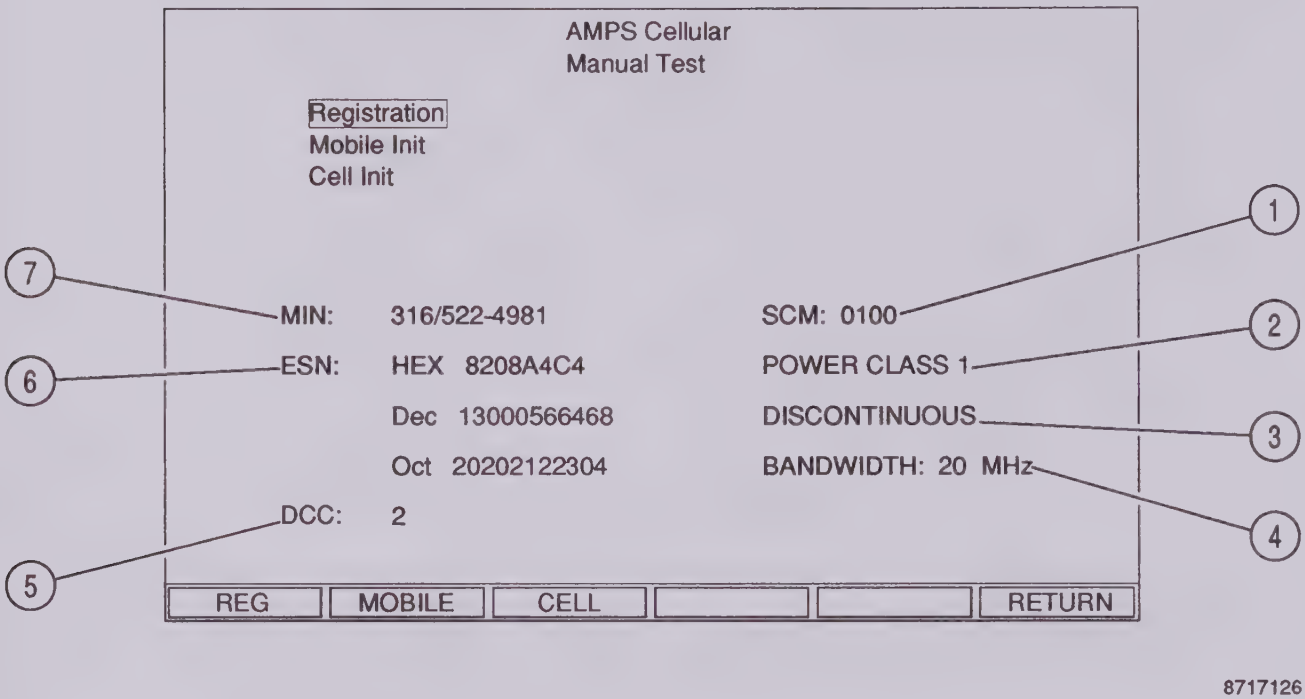
F2 MOBILE
Initiates Manual Mobile Initiated Call Test.

F3 CELL
Initiates Manual Cell Site Initiated Call Test.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

A. REGISTRATION TEST

The Registration Test simulates a Registration order from the Cell Site and tests the Mobile Phone's response. To perform the Registration Test, press REG Soft Function Key F1. After the Registration Tests are completed the following results appear:



8717126

1. SCM

   Displays 4 least significant Station Class Mark bits.

2. Power Class

   Displays Power Class of Mobile Phone under test.

3. Transmission State

   Displays Transmission State, Continuous or Discontinuous, of Mobile Phone under test.

4. Bandwidth

   Displays bandwidth of Mobile Phone under test. 20 MHz allows channels 1 to 666. 25 MHz allows channels 1 to 1023.

5. DCC

   Displays Digital Color Code last received by Mobile Phone under test.

6. ESN

   Displays Electronic Serial Number of Mobile Phone under test in Hexadecimal, Decimal and Octal.

7. MIN

   Displays Mobile Identification Number of Mobile Phone under test.

F1 REG
Initiates Manual Registration Test.

F2 MOBILE
Initiates Manual Mobile Initiated Call Test.

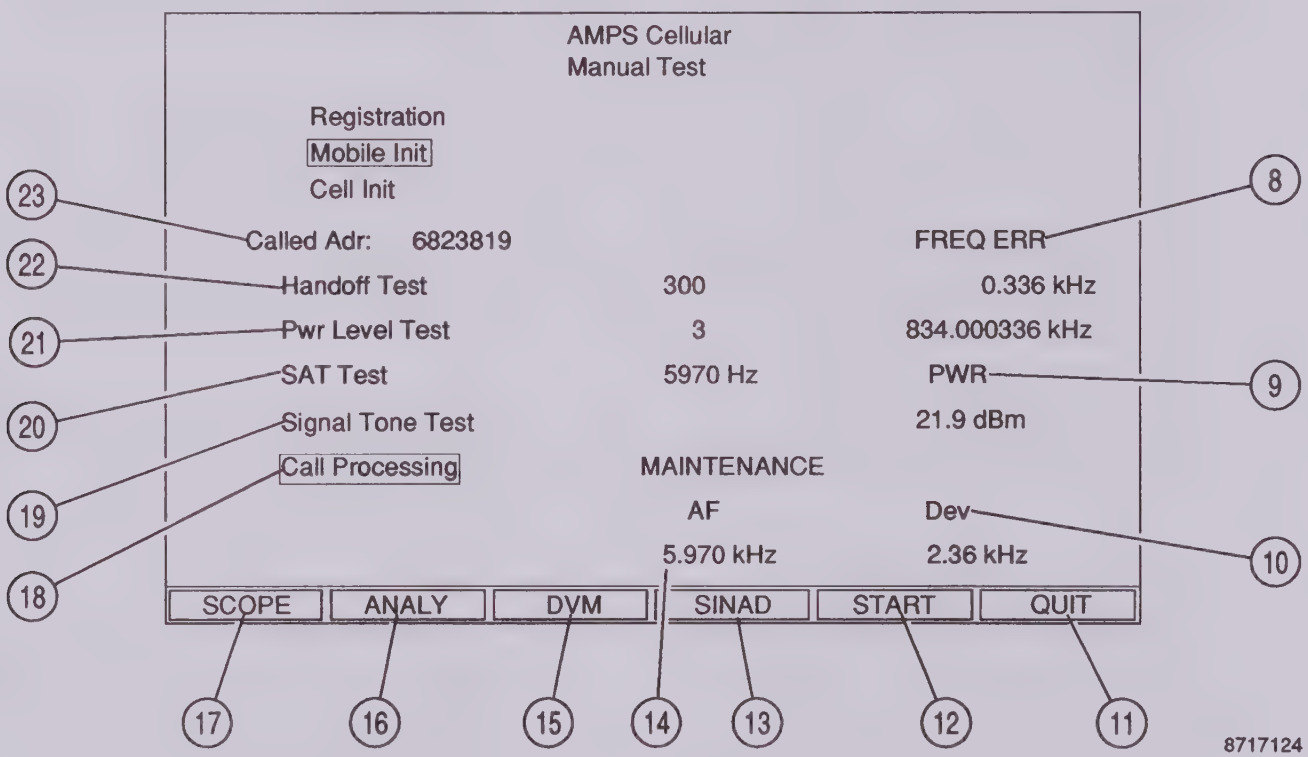
F3 CELL
Initiates Manual Cell Site Initiated Call Test.

F6 RETURN
Returns Operation to AMPS Cellular Menu.

B. MOBILE INIT TEST

The Mobile Init (Initiated) Test requires a call to be initiated from the Mobile Phone. To perform the Mobile Init Test, press MOBILE Soft Function Key F2 from AMPS Manual Test Menu. "Place Call" prompt appears. Place call using Mobile Phone under test.

Once a connection is made, the Mobile Init Screen appears containing the following data:



8. FREQ ERR

Displays Reverse Voice Channel Frequency and Frequency Error received from Mobile Phone.

9. PWR

Displays output power received from Mobile Phone.

10. Dev

Displays the SAT Deviation or Audio Deviation received from the Mobile Phone.

11. QUIT Soft Function Key F6

Press "QUIT" Soft Function Key F6 to exit Manual Mobile Init Screen.

12. START Soft Function Key F5

Initiates test at cursor location.

13. SINAD Soft Function Key F4

Accesses SINAD Meter for use with Cellular Testing. Refer to para 3-3-7(B) for SINAD Meter description and para 4-8-2 for SINAD Meter Operation.

14. AF

Displays SAT Frequency received from the Mobile Phone.

15. DVM Soft Function Key F3

Accesses SINAD Meter for use with Cellular Testing. Refer to para 3-3-7(C) for SINAD Meter description and para 4-8-3 for DVM Meter Operation.

16. ANALY Soft Function Key F2

Accesses Spectrum Analyzer for use with Cellular Testing. Refer to para 3-3-5 for Spectrum Analyzer Description. Refer to para 4-6 for Spectrum Analyzer Operation. Additional Field with Cellular Spectrum Analyzer is Return Cellular Field for returning to Manual Mobile Init Test Screen.

17. SCOPE Soft Function Key F1

Accesses Oscilloscope for use with Cellular Testing. Refer to para 3-3-4 for Oscilloscope Discription and para 4-5 for Oscilloscope Operation. Additions for Cellular Oscilloscope include allowing Demod Audio for input Source and Return Cellular Field for returning to Manual Mobile Init Test Screen.

18. Call Processing

Prompt for accessing Call Processing Tests. Call Processing Tests include ALERT, SEND CALLED ADDRESS, DTMF TEST, AUDIT and MAINTENANCE. Selected test is started by pressing START Soft Function Key F5.

ALERT Test is provided to observe AF (14) and Dev (10). Press START Soft Function Key F5 to initiate test. "Press Send to Clear" message is displayed. Observe AF (14) and Dev (10). Press Mobile Phone Send Key to terminate test.

SEND CALLED ADDRESS Test requires Mobile Phone to have placed phone call. Place call on Mobile Phone. Press START Soft Function Key F5.

DTMF TEST allows testing of Mobile Phone DTMF Transmission. Press START Soft Function Key F5 to initiate test. Window is displayed to enter DTMF Digits. Press keys on Mobile Phone and verify echo appears in Window. Press CLR WND Soft Function Key F5 to terminate test.

AUDIT Test exercises Audit Function of Mobile Phone. Press START Soft Function Key F5 to initiate test. Once Audit Test is complete, "Confirmation: Audit" Window is displayed.

MAINTENANCE Test is provided to observe AF (14) and Dev (10). Press START Soft Function Key F5 to initiate test. "Press Send to Clear" message is displayed. Observe AF (14) and Dev (10). Press Mobile Phone Send Key to terminate test.

19. Signal Tone Test

Signal Tone Test measures Signal Tone Frequency. Press START Soft Function Key F5 to initiate test. "Measuring Frequency" message appears indicating Maintenance Order is sent to the Mobile Phone for measuring Signal Tone frequency. Once test is complete, "Press Flash Hook" message is displayed. Press Flash Hook on Mobile Phone. "Flash Hook Detected" message is displayed. Press CLR WND Soft Function Key F5 to terminate test.

20. SAT Test

SAT Test allows change of SAT Frequency. To change SAT Frequency, press ENTER Key with cursor on SAT Test. Use DATA SCROLL Keys to select new SAT Frequency. Press ENTER Key. Verify AF (14) displays selected SAT Frequency.

21. Power Level Test

Each time a power level is entered, a VMAC message is sent to change the power level of the Mobile Phone to the level entered. To enter a power level, use DATA ENTRY Keys to enter a power level and press ENTER Key.

22. Handoff Test

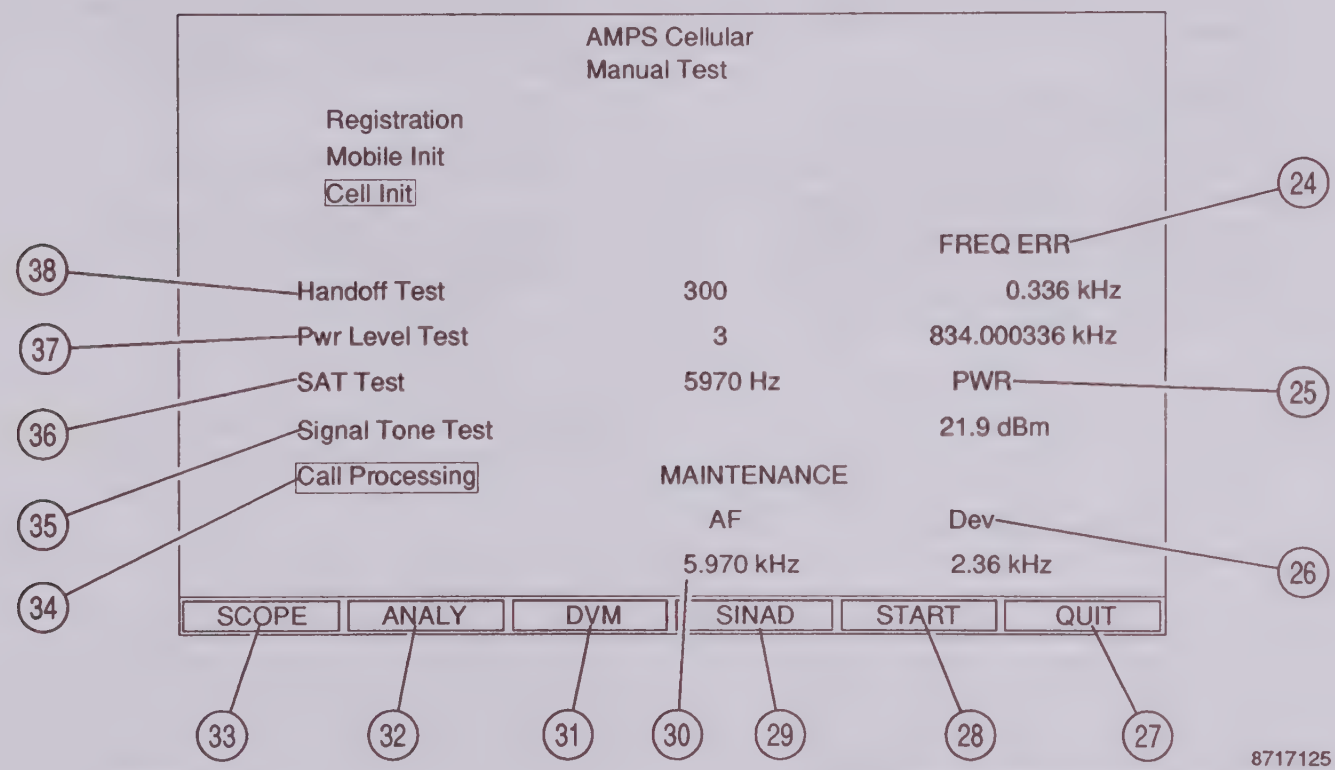
Handoff Test hands off Mobile Phone to another Cellular Channel. With cursor on Handoff Test, use DATA ENTRY Keys to select new Channel. Press ENTER Key. Verify FREQ ERR (8) changes to match new Channel.

23. Called Adr

Displays the address called by the Mobile Phone.

C. CELL INIT TEST

The Cell Init (Initiated) Test places a call to the Mobile Phone. To perform the Cell Init Test, press CELL Soft Function Key F3 from AMPS Manual Test Menu. "Paging Mobile", "Page Answered" and "Answer Phone" messages appear in order. Once "Answer Phone" message appears, answer Mobile Phone. Once a connection is made, the Cell Init Screen appears containing the following data:



24. FREQ ERR

Displays Reverse Voice Channel Frequency and Frequency Error received from Mobile Phone.

25 PWR

Displays output power received from Mobile Phone.

26. Dev

Displays the SAT Deviation or Audio Deviation received from the Mobile Phone.

27. QUIT Soft Function Key F6

Press "QUIT" Soft Function Key F6 to exit Manual Cell Init Screen.

28. START Soft Function Key F5

Initiates test at cursor location.

29. SINAD Soft Function Key F4

Accesses SINAD Meter for use with Cellular Testing. Refer to para 3-3-7(B) for SINAD Meter description and para 4-8-2 for SINAD Meter Operation.

30. AF

Displays the SAT Frequency received from the Mobile Phone.

31. DVM Soft Function Key F3

Accesses SINAD Meter for use with Cellular Testing. Refer to para 3-3-7(C) for SINAD Meter description and para 4-8-3 for DVM Meter Operation.

32. ANALY Soft Function Key F2

Accesses Spectrum Analyzer for use with Cellular Testing. Refer to para 3-3-5 for Spectrum Analyzer Description. Refer to para 4-6 for Spectrum Analyzer Operation. Additional Field with Cellular Spectrum Analyzer is Return Cellular Field for returning to Manual Mobile Init Test Screen.

33. SCOPE Soft Function Key F1

Accesses Oscilloscope for use with Cellular Testing. Refer to para 3-3-4 for Oscilloscope Discription and para 4-5 for Oscilloscope Operation. Additions for Cellular Oscilloscope is allowing Demod Audio for input Source and Return Cellular Field for returning to Manual Mobile Init Test Screen.

34. Call Processing

Prompt for accessing Call Processing Tests. Call Processing Tests include ALERT, SEND CALLED ADDRESS, DTMF TEST, AUDIT and MAINTENANCE. Selected test is started by pressing START Soft Function Key F5.

ALERT Test is provided to observe AF (14) and Dev (10). Press START Soft Function Key F5 to initiate test. "Press Send to Clear" message is displayed. Observe AF (14) and Dev (10). Press Mobile Phone Send Key to terminate test.

SEND CALLED ADDRESS Test requires Mobile Phone to have placed phone call. Place call on Mobile Phone. Press START Soft Function Key F5.

DTMF TEST allows testing of Mobile Phone DTMF Transmission. Press START Soft Function Key F5 to initiate test. Window is displayed to enter DTMF Digits. Press keys on Mobile Phone and verify echo appears in Window. Press CLR WND Soft Function Key F5 to terminate test.

AUDIT Test exercises Audit Function of Mobile Phone. Press START Soft Function Key F5 to initiate test. Once Audit Test is complete, "Confirmation: Audit" Window is displayed.

MAINTENANCE Test is provided to observe AF (14) and Dev (10). Press START Soft Function Key F5 to initiate test. "Press Send to Clear" message is displayed. Observe AF (14) and Dev (10). Press Mobile Phone Send Key to terminate test.

35. SIgnal Tone Test

Signal Tone Test measures Signal Tone Frequency. Press START Soft Function Key F5 to initiate test. "Measuring Frequency" message appears indicating Maintenance Order is sent to the Mobile Phone for measuring Signal Tone frequency. Once test is complete, "Press Flash Hook" message is displayed. Press Flash Hook on Mobile Phone. "Flash Hook Detected" message is displayed. Press CLR WND Soft Function Key F5 to terminate test.

36. SAT Test

SAT Test allows change of SAT Frequency. To change SAT Frequency, press ENTER Key with cursor on SAT Test. Use DATA SCROLL Keys to select new SAT Frequency. Press ENTER Key. Verify AF (14) displays selected SAT Frequency.

37. Power Level Test

Each time a power level is entered, a VMAC message is sent to change the power level of the Mobile Phone to the level entered. To enter a power level, use DATA ENTRY Keys to enter a power level and press ENTER Key.

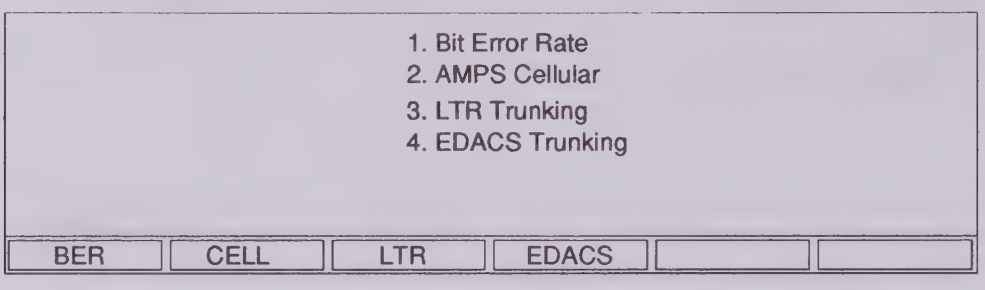
38. Handoff Test

Handoff Test hands off Mobile Phone to another Cellular Channel. With cursor on Handoff Test, use DATA ENTRY Keys to select new Channel. Press ENTER Key. Verify FREQ ERR (8) changes to match new Channel.

7-14 EDACS TRUNKING (Option 16)

The EDACS trunking option is used to test radios and repeaters of the EDACS trunked-radio signaling type. EDACS Trunked Radio System is a product of GE/Ericsson. The COM-120B EDACS option runs in manual and automatic modes for radio and repeater testing.

To execute EDACS Trunking Option, the selection is made from the Special Test screen. Press the SPCL Mode Key on the front panel for this selection screen:



00616011

Press Soft Function Key F4 or cursor to selection '4. EDACS Trunking' and press the ENTER Hardkey to access the EDACS Trunking screen.

Soft Function Keys available with this function include:

F1 AUTO
Accesses the Automatic Test screen.

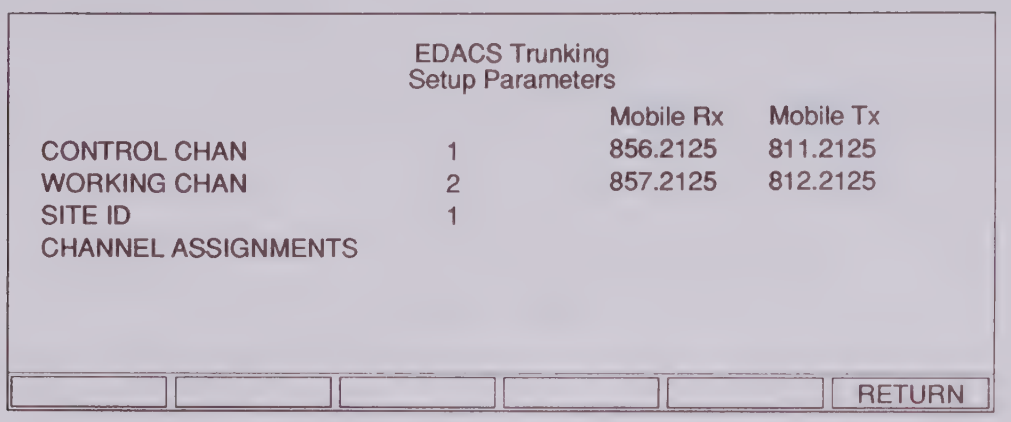
F2 MANUAL
Accesses the Manual Test screen.

F3 SETUP
Accesses the Setup Screen.

F6 RETURN
Returns to Specials Screen.

7-14-1 EDACS TRUNKING SETUP SCREEN

EDACS Trunking Setup Screen:



00616010

1. CONTROL CHAN

This field is used to select a logical channel for use as a control channel. The actual RF Frequencies display to the right of the channel number, in relationship to a mobile radio. The logical channels (1-20) are programmed under the CHANNEL ASSIGNMENTS Menu selection. The control channel set here is used as the control channel for establishing connections (call processing) with the radio in the Automatic Test (Radio) and the Manual Test (Repeater Simulator).

Soft Function Keys available with this function include:

F6 RETURN
Returns to EDACS Trunking Option screen.

2. WORKING CHAN

This field is used to select a logical channel for use as a working channel. The actual RF Frequencies display to the right of the channel number, in relationship to a mobile radio. The logical channels (1-20) are programmed under the CHANNEL ASSIGNMENTS Menu selection. The working channel set here is used as the working channel for the Automatic Test (Radio) and as the Gen/Rec Frequencies for the Automatic Test (Repeater).

Soft Function Keys available with this function include:

F6 RETURN
Returns to EDACS Trunking Option screen.

3. SITE ID

This field is used to select the Site ID to use in the overhead messages in the Automatic Test and the Manual Test (Repeater Simulator). The value range is 1 to 31.

Soft Function Keys available with this function include:

F6 RETURN
Returns to EDACS Trunking screen.

4. CHANNEL ASSIGNMENTS

This field is used to program the 20 logical channels for the EDACS Trunking tests. These programmed frequencies are used for all channels referenced in the Automatic and Manual Tests.

Soft Function Keys available with this function include:

F1 MENU
Accesses a pop up menu to program the logical channels.

F6 RETURN
Returns to EDACS Trunking screen.

7-14-2 EDACS TRUNKING CHANNEL ASSIGNMENTS

This field is used to program the 20 logical channels for the EDACS Trunking tests. These programmed frequencies are used for all channels referenced in the Automatic and Manual Tests.

EDACS CHANNEL ASSIGNMENTS

Chan	Format	No.	Mobile Rx	Mobile Tx
1	800 MHz	100	853.4875 MHz	808.4875 MHz
2	800 MHz	33	851.8125 MHz	806.8125 MHz
3	900 MHz	201	937.5125 MHz	898.5125 MHz
4	User		465.8125 MHz	425.8125 MHz
5	800 MHz	5	851.1125 MHz	806.1125 MHz
6	800 MHz	6	851.1375 MHz	806.1375 MHz
7	800 MHz	7	851.1625 MHz	806.1625 MHz
8	User		432.8125 MHz	412.8125 MHz
9	800 MHz	9	851.2125 MHz	806.2125 MHz
10	800 MHz	10	851.2375 MHz	806.2375 MHz

800 MHz | 900 MHz | USER | PG UP | PG DN | RETURN

00616012

There are a total of 20 logical channels available for programming. Two pages of 10 per page. Each logical channel is capable of being an (FCC) 800 MHz or 900 MHz Standard Channel No. or a user defined RF Frequency pair ranging from 0 to 1000.0000 MHz.

There is no correlation between the logical channel number and an FCC number. The logical channel numbers are programmed to work with the system under test's channel numbers. The ability to assign an FCC Standard Channel No. to a logical channel is only for ease of programming.

1. Format

Designates the format used.

Soft Function Keys available with this function include:

F1 800 MHz
Selects FCC 800 MHz format. If 800 MHz is the current format when an edit is started, (ENTER pressed), the value under the No. column is edited to set the Rx/Tx Frequencies to an FCC standard channel (1-760).

F2 900 MHz
Selects FCC 900 MHz format. If 900 MHz is the current format when an edit is started, (ENTER pressed), the value under the No. column is edited to set the Rx/Tx Frequencies to an FCC standard channel (1-760).

F3 USER
Selects User-Defined as the current format.

F4 PG UP
Accesses the first page of EDACS Channel Assignments.

F6 RETURN
Returns to EDACS Trunking Setup Parameters screen.

2. Mobile Rx

Manually enter the Mobile Receiver frequency. If the Format field is not set to USER, it is forced to user and the No. field is set to null.

F4 PG UP
Accesses the first page of EDACS Channel Assignments.

F5 PG DN
Accesses the second page of EDACS Channel Assignments.

F6 RETURN
Returns to EDACS Trunking Setup Parameters screen.

3. Mobile Tx

Manually enter the Mobile Transmitter frequency. If the Format field is not set to USER, it is forced to user and the No. field is set to null.

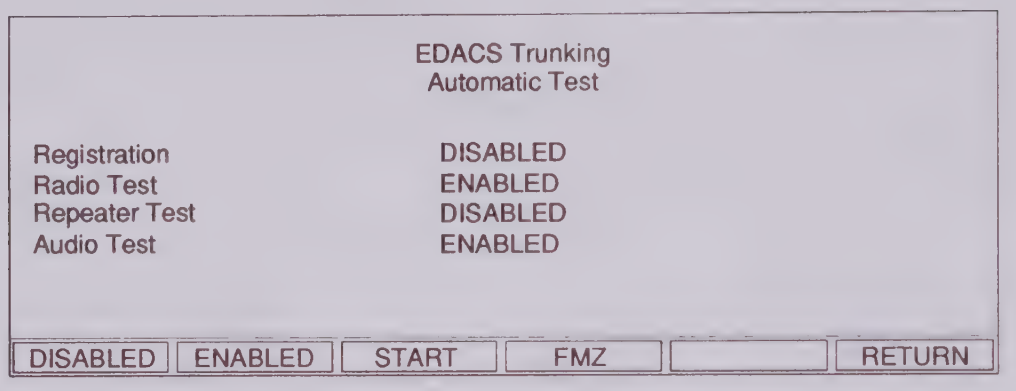
F4 PG UP
Accesses the first page of EDACS Channel Assignments.

F5 PG DN
Accesses the second page of EDACS Channel Assignments.

F6 RETURN
Returns to EDACS Trunking Setup Parameters screen.

7-14-3 EDACS TRUNKING AUTOMATIC TEST

EDACS Trunking Automatic Test Screen:



00616009

The Automatic Test consists of 4 main parts. Registration, Radio Test, Repeater Test and Audio Test. Each Test is either ENABLED or DISABLED. This state of the Automatic Test is referred to as the 'Idle' state. All Automatic Tests are run with the UUT connected to the T/R port for both transmit and receive operations.

1. Registration

If ENABLED, Registration is the first test executed for the Automatic Test. It simply captures a login message from the radio and displays the Radio's Group and Logical ID's along with the Control/Working channel frequencies.

Soft Function Keys available with this function include:

F1 DISABLED
Disables the test.

F2 ENABLED
Enables the test.

F3 START
Starts execution of the Automatic Test.

F4 FMZ
Used to FM-Zero (calibrate) the DC offset in the receiver. If the Radio has trouble completing a Group Call, perform an FM-Zero operation.

F6 RETURN
Returns to the EDACS Trunking screen.

2. Radio Test

If ENABLED, Radio Test executes and completes a Group Call sequence with a radio and measures the Radio's Transmitter Frequency Error, Transmitter RF Power, High-Speed Data Deviation, Subaudible Data Deviation and Voice Peak Deviation.

Soft Function Keys available with this function include:

F1 DISABLED
Disables the test.

F2 ENABLED
Enables the test.

F3 START
Starts execution of the Automatic Test.

F4 FMZ
Used to FM-Zero (calibrate) the DC offset in the receiver. If the Radio has trouble completing a Group Call, perform an FM-Zero operation.

F6 RETURN
Returns to the EDACS Trunking screen.

3. Repeater Test

If ENABLED, the Repeater Test measures the Repeater's Transmitter Frequency Error and Transmitter RF Power.

Soft Function Keys available with this function include:

F1 DISABLED
Disables the test.

F2 ENABLED
Enables the test.

F3 START
Starts execution of the Automatic Test.

F4 FMZ
Used to FM-Zero (calibrate) the DC offset in the receiver. If the Radio has trouble completing a Group Call, perform an FM-Zero operation.

F6 RETURN
Returns to the EDACS Trunking screen.

7-14-4 EDACS TRUNKING AUTOMATIC TEST EXECUTION

Press START Soft Function Key F3 to execute the Automatic Test. At least one of these tests must be ENABLED: Registration, Radio Test or Repeater Test. If one or more of these tests is not ENABLED, the screen displays, "INVALID SELECTS" and the test does not execute. The Audio Test only applies to the Radio Simulator and Repeater Simulator.

A. REGISTRATION

When ENABLED, Registration executes first. The field status changes from ENABLED to RUNNING. The Control Channel programmed from the Setup screen is used for the RF Frequencies and the COM-120B begins generating Site ID messages (overhead). The screen prompts to, "Turn on Power to Radio".

The COM-120B then looks for the login message (data) from the Radio. The Radio must be programmed to do automatic login. When the login message is found, the COM-120B acknowledges the login back to the Radio and captures the Radio's Group and Logical ID which displays along with the Control/Working channel frequencies used. The field status changes to COMPLETE when the test is finished and goes to the next ENABLED part in the Automatic Test.

Soft Function Keys available with this function include:

F6 ABORT
Aborts Registration, changes the field status to display ABORTED and no further tests are executed.

B. RADIO TEST

If ENABLED, Radio Test executes next. The field status changes from ENABLED to RUNNING. The Control Channel programmed from the Setup screen is used for the RF Frequencies and the COM-120B begins generating Site ID messages (overhead). The Radio locks onto the COM-120B. If the Push-to-Talk cable properly connected, the Radio performs a hands-free PTT (Group Call). If not, the screen prompts to manually press the PTT button, "Press PTT now (Group Call)".

The Radio should connect with the COM-120B at this point. If a successful Group Call was achieved, the Control/Working channels and the Radio's Group/Logical ID's are displayed and the test measurements begin with the message: "Taking Measurements...".

The PTT button must remain depressed during the measurements (if doing manual PTT). If not, the Radio Test terminates and the field status changes to DROPPED. The message, "CALL DROP" is briefly displayed.

When the Voice Peak Deviation Test begins, the screen prompts to whistle (or blow) into microphone and updates the deviation accordingly. The PTT button must remain depressed during Voice Peak Deviation measurement. If Audio Tests are planned, skip this test. The Radio's microphone is disabled if Audio Connectors are in place. If the CONT or SKIP softkey is pressed, the Radio test finishes and the field

status changes to COMPLETE. Results of the test are shown and the screen prompts to release the PTT button. If the Radio has the Push-to-Talk cable connected, the PTT is automatically released.

Soft Function Keys available with this function include:

F4 CONT
Continues on with Auto Test.

F5 SKIP
Skips the current test.

F6 ABORT
Aborts Radio Test, changes the field status to display ABORTED and no further tests are executed.

If the Audio Test is ENABLED, it is performed next on the Radio. The field status changes to RUNNING and the screen prompts to, "Install Audio Connectors. Press CONT when ready". It is extremely important that audio connections to the Radio are installed correctly. Press CONT Soft Function Key F4 to continue the test. The COM-120B establishes a Group Call identical to the Group Call used in the Radio Test. If the PTT cable is properly connected, the Radio is instructed to automatically engage the PTT button. Otherwise, manually depress the PTT button. Once the Radio is connected via Group Call, the screen displays the message: "Taking Measurements...". The PTT button must remain depressed (if manually doing PTT) during measurements or the Audio Test terminates. The field status indicates DROPPED. The message, "CALL DROP" is briefly displayed.

After the Transmitter Audio Tests are complete, the COM-120B prompts to release PTT (if manual PTT) and calls the Radio to do Receiver Audio Tests. When the call to the Radio is complete, the screen prompts to, "Set Radio Volume to Maximum. Press CONT when ready". Check the Radio for a busy ('BSY') light indicator and/or a Group Call (GR) light indicator with the caller,s Logical ID which indicates a successful call to the Radio. If the call is not successful, ABORT the test.

If the CONT Soft Function Key F4 is pressed, the screen displays the message: "Taking Measurements". The field status changes to COMPLETE when the test is finished and goes to the next ENABLED part in the Automatic Test.

Soft Function Keys available with this function include:

F4 CONT
Continues on with Auto Test.

F5 SKIP
Skips the current test.

F6 ABORT
Aborts Audio Test-Radio, changes the field status to display ABORTED and no further tests are executed.

C. REPEATER TEST

If ENABLED, Repeater Test executes next. The field status changes from ENABLED to RUNNING. The Working Channel programmed from the Setup screen is used for the RF Frequencies. The Repeater Test is a conventional-mode test. Manually control the Repeater Transmitter/ Receiver as instructed by the COM-120B. When the test begins, the screen prompts, "Turn on Repeater transmitter now". Once the transmitter is on, the screen displays the message: "Taking Measurements...". The Repeater Transmitter must remain on during measurements. If not, the test terminates and the field status indicates DROPPED. The message, "REPEATER DROP" is briefly displayed.

Soft Function Keys available with this function include:

F6 ABORT
Aborts Radio Test, changes the field status to display ABORTED and no further tests are executed.

If the Audio Test is ENABLED, it is performed next on the Repeater. The field status changes to RUNNING and the screen prompts to, "Install Audio Connectors. Press CONT when ready". It is extremely important that audio connections to the Repeater are installed correctly. Press CONT Soft Function Key F4 to continue the test. If the Repeater's Transmitter is not on, the screen prompts for it to be turned on. Once the Repeater is transmitting, the screen displays the message: "Taking Measurements...". The Repeater Transmitter must remain on during measurements. If not, the test terminates and the field status indicates DROPPED. The message, "REPEATER DROP" is briefly displayed. The field status changes to COMPLETE when the test is finished.

Soft Function Keys available with this function include:

F4 CONT
Continues on with Auto Test.

F5 SKIP
Skips the current test.

F6 ABORT
Aborts Audio Test-Repeater, changes the field status to display ABORTED and no further tests are executed.

7-14-5 EDACS TRUNKING AUTOMATIC TEST RESULTS

After Automatic Testing is complete, use the softkeys to display or print the results.

Soft Function Keys available with this function include:

F1 RESET
Puts the Automatic Test back to the 'Idle' state.

F2 RESULTS
Shows the next page of available results.

F3 START
Starts the Automatic Test over again, clearing out any previous test results.

F4 PRINT
Prints all available results to the serial port on the COM-120B rear panel.

F6 RETURN
Exits the Automatic Test screen and returns to the EDACS Option screen.

Press RESULTS Soft Function Key F2 to show the first page of results. Results appear in the lower half of the EDACS Trunking Automatic Test screen.

The following text describes the test results and their significance in order of appearance on the screen.

If only Registration was ENABLED, only the first three rows of results are shown.

Results: Radio Test

	[Radio]	
	Mobile Rx	Mobile Tx
CONTROL CHANNEL	856.2125	811.2125
WORKING CHANNEL	857.2125	812.2125
LOGICAL/GROUP ID	1002/100	
TX FREQ ERROR:	-0.199 kHz	
TX RF POWER:	827.4 mW	
TX DATA DEV:	3.20 kHz	
SUB-AUDIBLE DEV:	0.68 kHz	
VOICE AUDIO DEV:	4.14 kHz	

00616008

CONTROL CHANNEL
Shows the Mobile Radio's Receive/ Generate RF Frequencies used for the test as the EDACS Control Channel.

WORKING CHANNEL
Shows the Mobile Radio's Receive/ Generate RF Frequencies used for the test as the EDACS Working Channel.

LOGICAL/GROUP ID
Shows the Mobile Radio's Logical ID and Group ID which was acquired from the Group Call (or Login message if Registration only) performed during the Radio Test.

TX FREQ ERROR
Shows the RF Frequency Error of the radio transmitter kHz.

TX RF POWER
Shows the RF Power of the radio transmitter in mW (if less than 1 Watt) or Watts.

TX DATA DEV
Shows the Deviation of the Radio's high-speed data in kHz.

SUB-AUDIBLE DEV
Shows the Deviation of the Radio sub-audible data during transmission of a Group Call in kHz.

VOICE AUDIO DEV
Shows the Peak Deviation of transmitted microphone audio from the Radio in kHz.

Results: Audio Test (Radio)

[Radio]		
TX DEVIATION @ 15 m Vrms:	3.73 kHz	
TX MOD LIMITING @ 300 Hz:	4.15 kHz	110m Vp
TX MOD LIMITING @ 3 kHz:	2.89 kHz	110m Vp
TX MOD LIMITING (Burst):	3.68 kHz	110m Vp
TX AUDIO DISTORTION:	2.8%	
RX AUDIO SESITIVITY:	878.4m Vp_p	0.30 Vrms
RX SINAD @ 12dB:	-121.8 dBm	

00616007

These are all the test results available for the Audio Test-Radio except for the Tx Audio Response results. Some of these results are based on the ***Rated Output*** of the radio. This is acquired by injecting a 1 kHz sine wave via the Data Gen output jack and raising the level until 3 kHz of deviation is transmitted by the radio.

TX DEVIATION @ 15 mVrms

This result is the deviation reading (in kHz) of the Radio transmitter modulating a 1 kHz sine wave injected into the Radio's audio-in path from the COM-120B Data Gen output baseband jack at 15 mVrms level. Does not include any deviation from the Radio's sub-audible data.

TX MODULATION LIMITING @ 300 Hz

This result is the deviation reading (in kHz) of the Radio transmitter modulation with a 300 Hz sine wave injected into the Radio's audio-in path from the COM-120B Data Gen output baseband jack at a level which is 20 dB higher than 60% of the Radio's ***Rated Output***. The result in the right column is the actual level in mVp which was used to make the deviation measurement.

TX MODULATION LIMITING @ 3 kHz

This result is the deviation reading (in kHz) of the Radio transmitter modulation with a 3 kHz sine wave injected into the Radio's audio-in path from the COM-120B Data Gen output baseband jack at a level which is 20 dB higher than 60% of the Radio's ***Rated Output***. The result in the right column is the actual level in mVp which was used to make the deviation measurement.

TX MODULATION LIMITING (Burst)

This result is the peak deviation reading (in kHz) of the Radio transmitter modulation with a burst of 1 kHz sine wave injected into the Radio's audio-in path from the COM-120B Data Gen output baseband jack at a level which is 20 dB higher than 60% of the Radio's ***Rated Output***. The result in the right column is the actual level in mVp which was used to make the deviation measurement.

TX AUDIO DISTORTION

This result is the Distortion measurement in % of the Radio's transmitter with a 1 kHz sine wave injected into the Radio's audio-in path from the COM-120B Data Gen output baseband jack at the level of the Radio's ***Rated Output***. The Radio's sub-audible data is not included in this measurement.

RX AUDIO SENSITIVITY

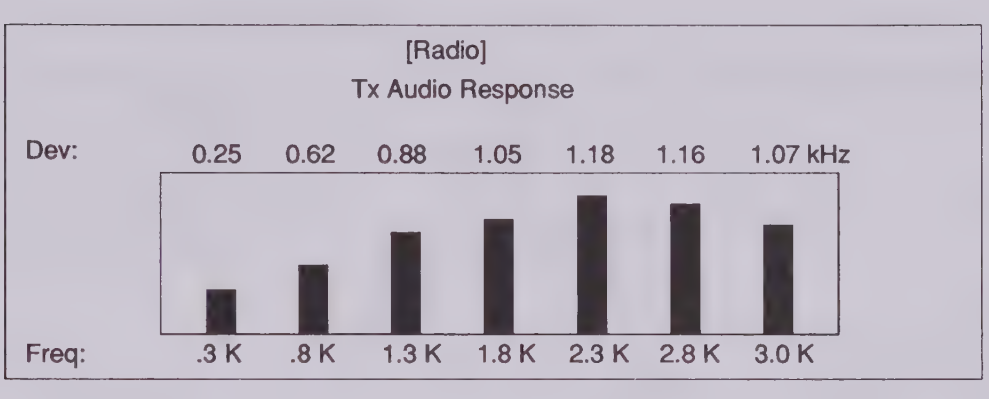
This result is the AF Level read back from the Radio's audio output path with a 1 kHz sine wave FM-generated at 3 kHz deviation, -50.0 dBm level, from the COM-120B to the Radio's antenna input (Radio must have receiver unsquelched). The AF Level voltage is then measured using wideband (no) filtering from the Audio/Data/SINAD Input baseband jack. The radio must be set at full volume to make this measurement. The result will be the AF Level voltage shown in Vrms and mV peak to peak.

RX SINAD @ 12 dB

This result is the SINAD reading from the Radio's audio output path with a 1 kHz sine wave FM-generated at 3 kHz deviation from the COM-120B to the Radio's antenna input (Radio must have receiver unsquelched). The COM-120B Generator RF Level starts at -105.0 dBm and lowered until a SINAD reading of 12 dB is acquired. Then the RF Level is recorded as the result of the test in dBm.

If the Radio squelches because of sub-audible drop out before the 12 dB SINAD is reached, the last good reading taken before the Radio squelched is recorded and shown along with the RF Level at that reading.

Results: Audio Test (Radio Tx Audio Response)



00616004

TX AUDIO RESPONSE

This shows the results of the measured deviation from the Radio's transmitter with a series of tone frequencies (sine wave) injected into the Radio's audio input path from the COM-120B Data Gen output baseband jack at 20% of the Radio's ***Rated Output***. The measurements do not include the Radio's sub-audible data deviation. The series of tone frequencies used are: 300 Hz, 800 Hz, 1300 Hz, 1800 Hz, 2300 Hz, 2800 Hz and 3000 Hz.

The following text describes the test results and their significance in order of appearance on the screen.

If only Registration was ENABLED, only the first three rows of results are shown.

Results: Repeater Test

	[Reptr] Repeater Rx	Repeater Tx
WORKING CHANNEL	857.2125	812.2125
TX FREQ ERROR:	-0.199 kHz	
TX RF POWER:	827.4 mW	

00616005

WORKING CHANNEL
Shows the Repeater's Receive/Generate RF Frequencies used for the test.

TX FREQ ERROR
Shows the RF Frequency Error of the Repeater transmitter in kHz.

TX RF POWER
Shows the RF Power of the Repeater transmitter in mW (if less than 1 Watt) or Watts.

Results: Audio Test (Repeater)

	[Reptr]	
TX DEVIATION @ 15 m Vrms:	0.73 kHz	
TX MOD LIMITING @ 300 Hz:	4.15 kHz	110m Vp
TX MOD LIMITING @ 3 kHz:	2.89 kHz	110m Vp
TX MOD LIMITING (Burst):	3.68 kHz	110m Vp
TX AUDIO DISTORTION:	1.8%	
RX AUDIO SESITIVITY:	878.4m Vp_p	0.30 Vrms
RX SINAD @ 12dB:	-121.8 dBm	

00616006

These are all the test results available for the Audio Test-Repeater except for the Tx Audio Response results. Some of these results are based on the ***Rated Output*** of the Repeater. This is acquired by injecting a 1 kHz sine wave via the Data Gen output jack and raising the level until 3 kHz of deviation is transmitted by the Repeater.

TX DEVIATION @ 15 mVrms

This result is the deviation reading (in kHz) of the Repeater transmitter modulating a 1 kHz sine wave injected into the Repeater's audio-in path from the COM-120B Data Gen output baseband jack at 15 mVrms level.

TX MODULATION LIMITING @ 300 Hz

This result is the deviation reading (in kHz) of the Repeater transmitter modulation with a 300 Hz sine wave injected into the Repeater's audio-in path from the COM-120B Data Gen output baseband jack at a level which is 20 dB higher than 60% of the Repeater's ***Rated Output***. The result in the right column is the actual level in mVp which was used to make the deviation measurement.

TX MODULATION LIMITING @ 3 kHz

This result is the deviation reading (in kHz) of the Repeater transmitter modulation with a 3 kHz sine wave injected into the Repeater's audio-in path from the COM-120B Data Gen output baseband jack at a level which is 20 dB higher than 60% of the Repeater's ***Rated Output***. The result in the right column is the actual level in mVp which was used to make the deviation measurement.

TX MODULATION LIMITING (Burst)

This result is the peak deviation reading (in kHz) of the Repeater transmitter modulation with a burst of 1 kHz sine wave injected into the Repeater's audio-in path from the COM-120B Data Gen output baseband jack at a level which is 20 dB higher than 60% of the Repeater's ***Rated Output***. The result in the right column is the actual level in mVp which was used to make the deviation measurement.

TX AUDIO DISTORTION

This result is the Distortion measurement in % of the Repeater's transmitter with a 1 kHz sine wave injected into the Repeater's audio-in path from the COM-120B Data Gen output baseband jack at the level of the Repeater's ***Rated Output***.

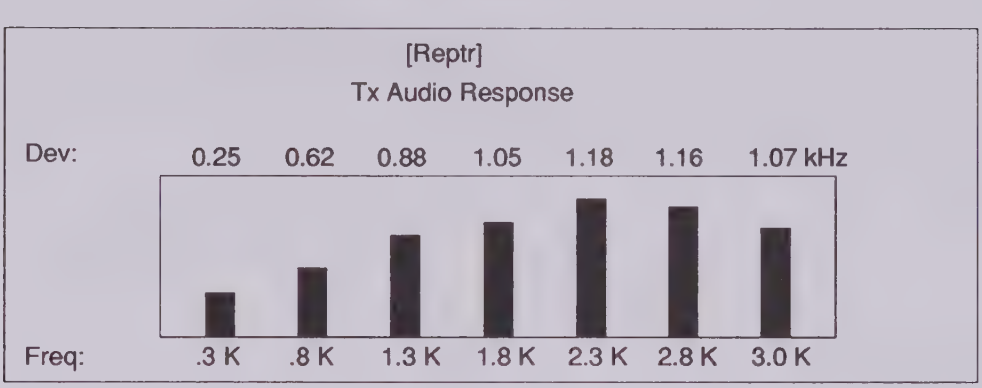
RX AUDIO SENSITIVITY

This result is the AF Level read back from the Repeater's audio output path with a 1 kHz sine wave FM-generated at 3 kHz deviation, -50.0 dBm level, from the COM-120B to the Repeater's RF input (Repeater must have receiver unsquelched). The AF Level voltage is then measured using wideband (no) filtering from the Audio/Data/SINAD Input baseband jack. The result will be the AF Level voltage shown in Vrms and mV peak to peak.

RX SINAD @ 12 dB

This result is the SINAD reading from the Repeater's audio output path with a 1 kHz sine wave FM-generated at 3 kHz deviation from the COM-120B to the Repeater RF input (Repeater must have receiver unsquelched). The COM-120B Generator RF Level starts at -105.0 dBm and lowered until a SINAD reading of 12 dB is acquired. Then the RF Level is recorded as the result of the test in dBm.

Results: Audio Test (Repeater Tx Audio Response)



00616003

TX AUDIO RESPONSE

This shows the results of the measured deviation from the Repeater's transmitter with a series of tone frequencies (sine wave) injected into the Repeater's audio input path from the COM-120B Data Gen output baseband jack at 20% of the Repeater's ***Rated Output***. The measurements do not include the Radio's sub-audible data deviation. The series of tone frequencies used are: 300 Hz, 800 Hz, 1300 Hz, 1800 Hz, 2300 Hz, 2800 Hz and 3000 Hz.

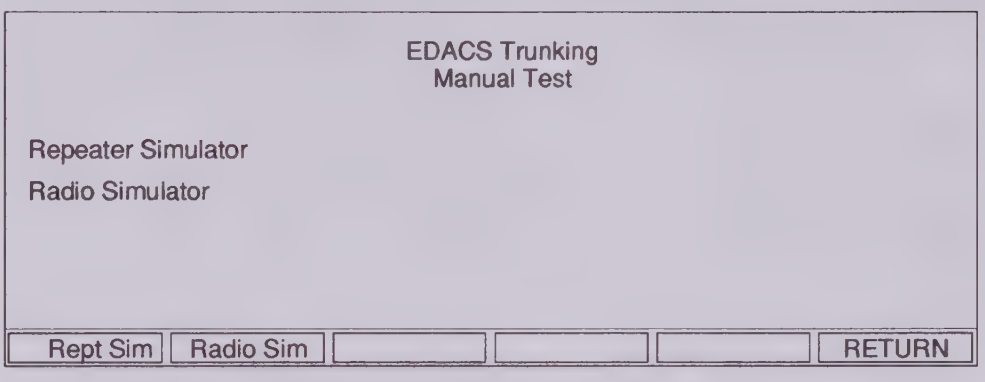
Automatic Test Results (Printout)

Printouts of the Automatic Tests are acquired by pressing PRINT Soft Function Key F4 after an automatic test has completed. Results are printed out the serial (RS-232) port on the COM-120B rear panel. The RS-232 line settings are set in the COM-120B Setup Screen, selection 5. Here is an example of a printout:

```
**************************IFR COM-120B EDACS AUTOMATIC TEST RESULTS**************************
DATE: Apr-6-1995                                                        TIME: 16:07:34

*****************************************RADIO TEST*****************************************

                              MOBILE RX       MOBILE TX
CONTROL CHANNEL:              856.2125        811.2125
WORKING CHANNEL:              857.2125        812.2125
RADIO LOGICAL ID:             1002
RADIO GROUP ID:               100
TX FREQ ERROR:                -0.199 kHz
TX RF POWER                   827.4 mW
TX DATA DEV:                  3.24 kHz
SUB-AUDIBLE DEV:              0.68 kHz
VOICE AUDIO DEV:              4.14 kHz


                                    [AUDIO TEST]

TX DEVIATION @ 15 mVrms:                  4.02 kHz
TX MOD LIMITING @ 300 Hz:                 4.15 kHz              110 mVp input
TX MOD LIMITING @ 3 kHz:                  4.45 kHz              110 mVp input
TX MOD LIMITING @ (BURST):                4.22 kHz              110 mVp input
TX AUDIO DISTORTION:                      2.2 %
TX AUDIO RESPONSE @ 300 Hz:               0.25 kHz
TX AUDIO RESPONSE @ 800 Hz:               0.85 kHz
TX AUDIO RESPONSE @ 1300 Hz:              1.25 kHz
TX AUDIO RESPONSE @ 1800 Hz:              1.35 kHz
TX AUDIO RESPONSE @ 2300 Hz:              1.55 kHz
TX AUDIO RESPONSE @ 2800 Hz:              1.55 kHz
TX AUDIO RESPONSE @ 3000 Hz:              1.35 kHz
RX AUDIO SENSITIVITY:                  1003.2 mVp-p      0.30 Vrms
RX SINAD @ 12 dB:                      -118.8 dBm        15.5 dB

*****************************************REPEATER TEST**************************************

                              REPTR RX        REPTR TX
WORKING CHANNEL:              857.2125        812.2125
TX FREQ ERROR:                -0.199 kHz
TX RF POWER                   827.4 mW


                                    [AUDIO TEST]

TX DEVIATION @ 15 mVrms:                  4.02 kHz
TX MOD LIMITING @ 300 Hz:                 4.15 kHz              110 mVp input
TX MOD LIMITING @ 3 kHz:                  4.45 kHz              110 mVp input
TX MOD LIMITING @ (BURST):                4.22 kHz              110 mVp input
TX AUDIO DISTORTION:                      2.2 %
TX AUDIO RESPONSE @ 300 Hz:               0.25 kHz
TX AUDIO RESPONSE @ 800 Hz:               0.85 kHz
TX AUDIO RESPONSE @ 1300 Hz:              1.25 kHz
TX AUDIO RESPONSE @ 1800 Hz:              1.35 kHz
TX AUDIO RESPONSE @ 2300 Hz:              1.55 kHz
TX AUDIO RESPONSE @ 2800 Hz:              1.55 kHz
TX AUDIO RESPONSE @ 3000 Hz:              1.35 kHz
RX AUDIO SENSITIVITY:                  1003.2 mVp-p      0.30 Vrms
RX SINAD @ 12 dB:                      -118.8 dBm
```

7-14-6 EDACS TRUNKING MANUAL TEST

EDACS Trunking Manual Test Screen:



00616002

The EDACS Trunking Manual Test consists of 2 main parts. A Repeater Simulator for testing EDACS Radios and a Radio Simulator for testing EDACS Repeaters.

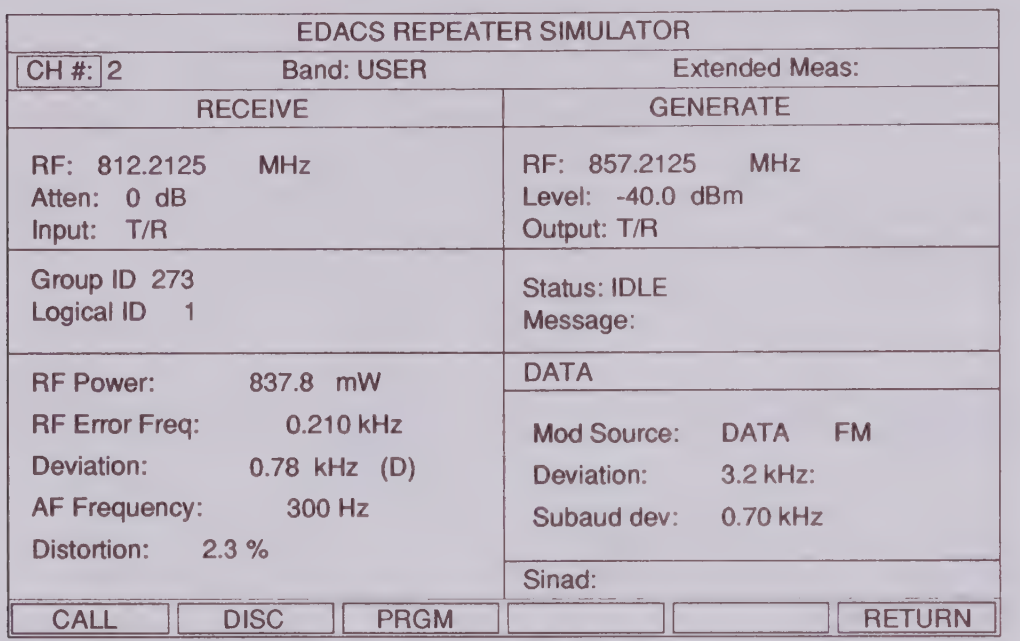
Soft Function Keys available with this function include:

F1 Rept Sim
Accesses the EDACS Repeater Simulator Screen.

F2 Radio Sim
Accesses the EDACS Radio Simulator Screen.

F3 RETURN
Returns to the EDACS Trunking Test screen.

7-14-7 EDACS TRUNKING MANUAL TEST-REPEATER SIMULATOR



00616001

Entering the Repeater Simulator causes the COM-120B to perform an FM-Zero operation to adjust the Receiver's DC offset to zero. The screen displays the message: "Doing FMZ...please wait.".

While in the Repeater Simulator and the Radio is not transmitting, or the repeater is not calling the Radio, the Site ID message is continuously transmitting. In this idle mode, the Repeater Simulator is looking for a Group Call (or Emergency Group Call) request from the Radio. When the request is found, the Repeater Simulator allows the Radio to transmit (until the Radio releases). The Group/Logical ID's are captured (and displayed) when the Group Call is made (and used to call a Radio). A Radio's Login is also decoded by the simulator and the ID's captured. There is also a mode of operation (activated by softkey) where the repeater simulates a Radio calling the Radio Under Test. In this mode, there are softkeys to disconnect and return back to the idle state.

1. CH#:

   This field is used to change the EDACS Working Channel Number (pre-programmed in the Setup Screen). Value range: 1 to 20. The corresponding RF Frequencies are shown in the RF fields as the CH# field is edited. This only changes the Working Channel. The Control Channel is taken from the Setup Screen and must be changed there if necessary.

   If the Band field is set to 'Manual', there is no channel number to edit. The PRGM Soft Function Key F3 may then be used to return to the channel Band mode.

   Soft Function Keys available with this function include:

F1 CALL
Makes a Group Call to the Radio, simulating a call from another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call to the Radio which was made previously using the CALL softkey.

F3 PRGM
Puts the 'Band' mode back to one of the channel modes: 800 MHz, 900 MHz or USER. The logical channels from the Setup Screen are then active. The simulator is taken out of the pre-programmed channel mode when the RF Frequencies are manually edited.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

2. Band:

This field shows the channel format for the Repeater Simulator Working Channel. Valid values are: 800 MHz, 900 MHz, USER or Manual. Display-only field. If 'Manual' is displayed, the RF Frequencies have been set manually in the Repeater Simulator. All other values are taken from the pre-programmed logical channels from the Setup Screen, according to the channel number set in the CH# field.

3. RF: (Receive)

This field shows the current RF Frequency of the EDACS Working Channel for the Receiver side of the Repeater Simulator. This field is editable (which puts the Working Channel in 'Manual' mode). Value range: 0 to 1000.0000 MHz.

Soft Function Keys available with this function include:

F1 CALL
Makes a Group Call to the Radio, simulating a call from another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call to the Radio which was made previously using the CALL softkey.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

4. Atten:

This field is used to set the Receiver Attenuation. Value range: 0 or 30 dB.

F1 30 dB
Sets the Receiver Attenuation to 30 dB.

F2 Sets the Receiver Attenuation to 0 dB.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

5. Input:

This field is used to select the Receiver's RF Input for the Repeater Simulator to the T/R or the Antenna port. Valid values are T/R or ANT.

Soft Function Keys available with this function include:

F1 T/R
Sets the Receiver Input to T/R.

F2 ANT
Sets the Receiver Input to ANT.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

6. Group ID:

This field shows the Radio's Group ID acquired from a Group Call or Login operation (if performed). This field is also used for the Group ID when making a call to the Radio Under Test. This field is editable. Value range: 0 to 2047.

Soft Function Keys available with this function include:

F1 CALL
Makes a Group Call to the Radio, simulating a call from another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call to the Radio which was made previously using the CALL softkey.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

7. Logical ID:

This field shows the Radio's Logical ID acquired from a Group Call or Login operation (if performed). This field is also used for the Logical ID when making a call to the Radio Under Test. This field is editable. Value range: 0 to 16383.

F1 CALL
Makes a Group Call to the Radio, simulating a call from another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call to the Radio which was made previously using the CALL softkey.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

8. RF Power:

This field shows the Radio's Transmitter RF Power in Watts (or mW). It is a display-only field (meter) with no cursor position. Value range: 0.0 mW to 10.00 W.

9. RF Error Freq:

This field shows the Radio's Transmitter RF Frequency Error in kHz. It is a display-only field (meter) with no cursor position. Value range: ±0.000 to 5.000 kHz.

10. Deviation: (Receive)

This field shows the Radio's Transmit Deviation for Voice or Data in kHz. Voice Deviation is designated with a 'V' symbol, and Data Deviation (low-frequency data) is designated with a 'D' symbol. Value range: 0.00 to 10.00 kHz.

Soft Function Keys available with this function include:

F1 DATA
Shows deviation of low-frequency (data) modulations.

F2 VOICE
Shows voice-range frequency modulations.

F3 FMZ
Used to FM-Zero the Receiver, which adjusts the DC offset to zero. Do this operation if the Radio is having trouble completing a Group Call.

F4 FM CAL
Makes an attempt to move the DC offset to zero in the Receiver. ***Not a recommended operation. The FMZ softkey should be tried first if the Radio does not complete a Group Call. This operation may work on a Radio Under Test that is extremely far off frequency. May require more than one try.***

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

11. AF Frequency:

This field shows the Radio's Transmitter Audio Frequency in Hz. It is a display-only field (meter) with no cursor position. Measuring range: 300 to 4500 Hz.

12. Distortion: (Receive)

This field shows the Radio's Transmitter Distortion in %. Value range: 0.0 to 20.0%. Also used to show decoded DTMF digits by pressing the DTMF softkey.

Soft Function Keys available with this function include:

F1 DIST
Selects Distortion readings (meter).

F2 OFF
Disable Distortion or DTMF readings.

F3 DTMF Selects DTMF decoding.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

13. Extended Meas:

This field allows access to one of three external screens: Scope, Analyzer or Digital Voltmeter (DVM). Radio-initiated Group Calls are still performed while in any of the three screens. If a call was made to the Radio and is still in progress, it is possible to access any of the three screens without interrupting the call. *However, there is no way to call the Radio Under Test or disconnect a made call while in the extended screens. The call must be made before entering an extended screen.* The *only* way to enter the extended screens is to use the softkeys. The 'Return' field in the extended screen allows a return to the Repeater Simulator.

Soft Function Keys available with this function include:

F1 SCOPE
Accesses the Scope Screen.

F2 ANALY
Accesses the Analyzer Screen.

F3 DVM
Accesses the Digital Voltmeter Screen.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

14. RF: (Generate)

This field shows the current RF Frequency of the EDACS Working Channel for the Generator side of the Repeater Simulator. This field is editable (which puts the Working Channel in 'Manual' mode). Value range: 0 to 1000.0000 MHz.

Soft Function Keys available with this function include:

F1 CALL
Makes a Group Call to the Radio, simulating a call from another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call to the Radio which was made previously using the CALL softkey.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

15. Level:

This field is used to set the Generator's RF Output Level in dBm. Value range: -40 to -130.0 dBm (T/R), 13.0 to -130.0 dBm (AUX) with AUX option.

Soft Function Keys available with this function include:

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

16. Output:

This field is used to set the Generator's RF Output source to the T/R port or the Auxiliary (AUX) RF port. Valid values: T/R or AUX.

F1 T/R
Sets the Generator RF Output to the T/R port.

F2 AUX
Sets the Generator RF Output to the AUX port.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

17. Status:

This field shows the current status of the Repeater Simulator. It is a display-only field. Valid status values:

IDLE
Repeater is in the idle state, generating overhead (Site ID) messages. In this state, the Radio may initiate a Group Call, do a Login or the simulator may initiate another call to another radio.

RADIO SETUP
Repeater is in the process of processing a Group Call from the Radio. *This message is usually very brief and may not be noticeable.*

RADIO INIT
Repeater successfully completes a Group (or emergency) Call from the Radio and call is in progress.

REP INIT
Repeater made a Group Call to the Radio.

18. Message:

Briefly shows the last EDACS message received from the Radio. Display-only field.

GROUP CALL
A Group Call message is received from the Radio

UN-KEYED
An un-keyed message is received from the Radio.

EMER GROUP
An Emergency Group Call message is received from the Radio.

LOGIN
A Login message is received from the Radio.

STATUS
A Status message is received from the Radio.

19. Mod Source:

This field is used to select a Generator source for modulation. GEN1, GEN2 and DTMF are only modulated when a call is made to the Radio. The DATA modulation field is used to modulate the EDACS signaling data. All enabled modulation sources display above the Mod Source field.

Soft Function Keys available with this function include:

F1 GEN1
Selects Function Generator 1 as the modulation source.

F2 GEN2
Selects Function Generator 2 as the modulation source.

F3 DATA
Selects Data Generator as the modulation source.

F4 DTMF
Selects DTMF as the modulation source.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

In the field to the right of Mod Source, select the modulation type for the selected source.

Soft Function Keys available with this function include:

F1 OFF
Turn off the selected Generator source.

F2 AM
Sets the selected Generator source for AM modulation.

F3 FM
Sets the selected Generator source for FM modulation.

F4 PM
Sets the selected Generator source for PM modulation.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

20. Deviation: (Generate)

This field is active when the selected source is FM or PM modulation type. This controls the deviation of the modulated source. Value range: 0.00 to 100.0 kHz for FM and 0.00 to 10.0 Rad for PM. *For deviation of DATA, 3.2 kHz is the recommended default value.*

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

21. Modulation:

This field is active when the selected source is AM modulation type. This controls the modulation of the selected source. Value range: 0.0% to 100.0%.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

22. Frequency:

This field is active when the selected source, GEN1 or GEN2, is modulated. This selects the Audio Frequency of the selected Function Generator source (sine wave). Value range: 0.0 Hz to 20000.0 Hz.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

23. Subaud dev:

This field is active when the selected source, DATA, is modulated. This controls the deviation of the sub-audible data used during established call processing with the EDACS Radio. Value range: 0.00 to 100.0 kHz. *Should be ≤ Deviation (20). The recommended default value is 0.70 kHz.*

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

24. Code:

This field is active when the selected source, DTMF, is modulated. This allows the entry of desired DTMF digits to use for DTMF source generation.

F1 CLEAR
Clears out any DTMF digits previously programmed in.

F2 CONT
Puts the DTMF Generation in the continuous mode.

F3 BURST
Used to one-shot the DTMF Generator source.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

25. Sinad:

This field is used to select a meter to read signals from the Audio/Data/ SINAD input baseband jack. The measurements appear to the right of this field. Valid selections:

Soft Function Keys available with this function include:

F1 DIST
Selects the Distortion meter for baseband measurements.

F2 SINAD
Selects the SINAD meter for baseband measurements.

F3 AF LVL
Selects the AF Level meter for baseband measurements.

F4 OFF
Disables baseband measuring.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

When baseband measurements are made, all receiver measurements including the DSP data decoding are disabled due to hardware limitations. Therefore an EDACS Radio-initiated call cannot be made with any baseband measurements enabled.

The Radio-initiated call must be made first, then the baseband measurements may be enabled during the call. Calling the Radio may be done at any time.

7-14-8 EDACS TRUNKING MANUAL TEST-RADIO SIMULATOR

EDACS RADIO SIMULATOR					
CH #: 2	Band: USER		Extended Meas:		
RECEIVE			GENERATE		
RF: 812.2125 MHz Atten: 0 dB Input: T/R			RF: 857.2125 MHz Level: -40.0 dBm Output: T/R		
Group ID 273 Logical ID 1			Status: NC Message:		
RF Power: 837.8 mW RF Error Freq: 0.210 kHz Deviation: 0.78 kHz (D) AF Frequency: 300 Hz Distortion: 2.3 %			DATA Mod Source: DATA FM Deviation: 3.2 kHz: Subaud dev: 0.70 kHz Sinad:		
CALL	DISC	PRGM			RETURN

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Entering the Repeater Simulator causes the COM-120B to perform an FM-Zero operation to adjust the Receiver's DC offset to zero. The screen displays the message: "Doing FMZ...please wait.".

While in the Radio Simulator the Control Channel is continually monitored looking for SITE-ID from the controller. If not found, the NC status is shown. When a SITE-ID message is found, the status goes to IDLE. This allows Group Calls to be made (Push-to-Talk) or calls to be made to the COM-120B from another Radio as dictated by the Repeater. There are 3 main call-processing sequences supported in the Radio Simulator. Perform a Group Call, receive a call in response to a Channel Assignment message from a Repeater and receive a call in response to a Channel Update message from a Repeater (if coming on-line during a call).

Several error conditions can occur during the Radio Simulation. Error messages display briefly under these conditions. The error messages:

LOST CHANNEL
: The Radio has lost contact with the Repeater during a Group Call.

CHAN OUT OF RANGE
: A channel assignment from the Repeater was out of pre-programmed Channel range.

INVALID ID
: An ID other than what was set in the Logical/Group ID fields was used to call the Radio Simulator.

NO UN-MUTE FOUND
: The Repeater has transmitted the channel assignment to the Radio Simulator for calling the simulator, but did not send the Un-mute message on the Working Channel.

NO CHAN ASSGN FOUND
The Channel Assignment message was not received from the Repeater when a Group Call (PTT) was executed from the Radio Simulator.

1. CH#:

This field is used to change the EDACS Control Channel Number (pre-programmed in the Setup Screen). Value range: 1 to 20. The corresponding RF Frequencies are shown in the RF fields as the CH# field is edited.

If the Band field is set to 'Manual', there is no channel number to edit. The PRGM Soft Function Key F3 may then be used to return to the channel Band mode.

Soft Function Keys available with this function include:

F1 CALL
Simulates a Group Call (PTT) to another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call (release PTT) which was made previously using the CALL softkey.

F3 PRGM
Puts the 'Band' mode back to one of the channel modes: 800 MHz, 900 MHz or USER. The logical channels from the Setup Screen are then active. The simulator is taken out of the channel mode when the RF Frequencies are manually edited.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

2. Band:

This field shows the channel format for the Radio Simulator Control Channel. Valid values are: 800 MHz, 900 MHz, USER or Manual. Display-only field. If 'Manual' is displayed, the RF Frequencies have been set manually in the Radio Simulator. All other values are taken from the pre-programmed logical channels from the Setup Screen, according to the channel number set in the CH# field.

3. RF: (Receive)

This field shows the current RF Frequency of the EDACS Control Channel for the Receiver side of the Radio Simulator. This field is editable (which puts the Control Channel in 'Manual' mode). Value range: 0 to 1000.0000 MHz.

Soft Function Keys available with this function include:

F1 CALL
Simulates a Group Call (PTT) to another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call (release PTT) which was made previously using the CALL softkey.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

4. Atten:

This field is used to set the Receiver Attenuation. Value range: 0 or 30 dB.

F1 30 dB
Sets the Receiver Attenuation to 30 dB.

F2 Sets the Receiver Attenuation to 0 dB.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

5. Input:

This field is used to select the Receiver's RF Input for the Radio Simulator to the T/R or the Antenna port. Valid values are T/R or ANT.

Soft Function Keys available with this function include:

F1 T/R
Sets the Receiver Input to T/R.

F2 ANT
Sets the Receiver Input to ANT.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

6. Group ID:

This field is used to select Radio Simulator's Group ID that is used when simulating a Group Call (PTT) to another Radio. This field is editable. Value range: 0 to 2047.

Soft Function Keys available with this function include:

F1 CALL
Simulates a Group Call (PTT) to another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call (release PTT) which was made previously using the CALL softkey.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

7. Logical ID:

This field is used to select Radio Simulator's Logical ID that is used when simulating a Group Call (PTT) to another Radio. This field is editable. Value range: 0 to 16383.

F1 CALL
Simulates a Group Call (PTT) to another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call (release PTT) which was made previously using the CALL softkey.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

8. RF Power:

This field shows the Repeater's Transmitter RF Power in Watts (or mW). It is a display-only field (meter) with no cursor position. Value range: 0.0 mW to 10.00 W.

9. RF Error Freq:

This field shows the Repeater's Transmitter RF Frequency Error in kHz. It is a display-only field (meter) with no cursor position. Value range: ±0.000 to 5.000 kHz.

10. Deviation: (Receive)

This field shows the Repeater's Transmit Deviation for Voice or Data in kHz. Voice Deviation is designated with a 'V' symbol, and Data Deviation (low-frequency data) is designated with a 'D' symbol. Value range: 0.00 to 100.0 kHz.

Soft Function Keys available with this function include:

F1 DATA
Shows deviation of low-frequency (data) modulations.

F2 VOICE
Shows voice-range frequency modulations.

F3 FMZ
Used to FM-Zero the Receiver, which adjusts the DC offset to zero. Do this operation if the Simulator is having trouble completing a Group Call or going to IDLE status.

F4 FM CAL
Makes an attempt to move the DC offset to zero in the Receiver. ***Not a recommended operation. The FMZ softkey should be tried first if the Radio does not complete a Group Call. This operation may work on a Simulator Under Test that is extremely far off frequency. May require more than one try.***

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

11. AF Frequency:

This field shows the Repeater's Transmitter Audio Frequency in Hz. It is a display-only field (meter) with no cursor position. Measuring range: 300 to 4500 Hz.

12. Distortion: (Receive)

This field shows the Repeater's Transmitter Distortion in %. Value range: 0.0 to 20.0%. Also used to show decoded DTMF digits by pressing the DTMF softkey.

Soft Function Keys available with this function include:

F1 DIST
Selects Distortion readings (meter).

F2 OFF
Disable Distortion or DTMF readings.

F3 DTMF Selects DTMF decoding.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

13. Extended Meas:

This field allows access to one of three external screens: Scope, Analyzer or Digital Voltmeter (DVM). If a Group Call (PTT) was made to another Radio and is still in progress, it is possible to access any of the three screens without interrupting the call. The *only* way to enter the extended screens is to use the softkeys. The 'Return' field in the extended screen allows a return to the Repeater Simulator.

Soft Function Keys available with this function include:

F1 SCOPE
Accesses the Scope Screen.

F2 ANALY
Accesses the Analyzer Screen.

F3 DVM
Accesses the Digital Voltmeter Screen.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

14. RF: (Generate)

This field shows the current RF Frequency of the EDACS Control Channel for the Generator side of the Radio Simulator. This field is editable (which puts the Control Channel in 'Manual' mode). Value range: 0 to 1000.0000 MHz.

Soft Function Keys available with this function include:

F1 CALL
Simulates a Group Call (PTT) to another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call (release PTT) which was made previously using the CALL softkey.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

15. Level:

This field is used to set the Generator's RF Output Level in dBm. Value range: -40 to -130.0 dBm (T/R), 13.0 to -130.0 dBm (AUX) with AUX option.

Soft Function Keys available with this function include:

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

16. Output:

This field is used to set the Generator's RF Output source to the T/R port or the Auxiliary (AUX) RF port. Valid values: T/R or AUX.

F1 T/R
Sets the Generator RF Output to the T/R port.

F2 AUX
Sets the Generator RF Output to the AUX port.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

17. Status

This field shows the current status of the Radio Simulator. Display-only field. Valid status values:

NC
No Control Channel overhead found from the Repeater. No calls accepted in this state.

IDLE
Radio is locked into a Repeater Site and is waiting to make a Group Call or accept a Group Call.

BEGIN CALL

A Group Call is initiated and call processing with the Repeater is in progress. This message is usually brief.

GROUP CALL

Radio Simulator successfully executed a Group Call and is transmitting/receiving on the Working Channel assigned by the Repeater Under Test. The Working Channel is displayed in parenthesis.

CALLED

A call is made to the Radio Simulator and is transmitting/receiving on the Working Channel assigned by the Repeater Under Test. The words "EMG" is displayed if an Emergency Group Call was made.

18. Message:

Briefly shows the last EDACS message received from the Repeater. Display-only field.

GRP CHAN ASSGN

A Group Call Channel Assignment message is received from the Repeater.

CH UPDATE

A Channel Update message is received from the Repeater.

CALL DROP

A Call Drop message is received from the Repeater.

19. Mod Source:

This field is used to select a Generator source for modulation. Sources are only modulated when a call (PTT) is initiated from the Radio Simulator. The DATA modulation field is to modulate the EDACS signaling data. All enabled modulation sources display above the Mod Source field.

Soft Function Keys available with this function include:

F1 GEN1
Selects Function Generator 1 as the modulation source.

F2 GEN2
Selects Function Generator 2 as the modulation source.

F3 DATA
Selects Data Generator as the modulation source.

F4 DTMF
Selects DTMF as the modulation source.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

To the right of Mod Source, select the modulation type for the selected source.

Soft Function Keys available with this function include:

F1 OFF
Turn off the selected Generator source.

F2 AM
Sets the selected Generator source for AM modulation.

F3 FM
Sets the selected Generator source for FM modulation.

F4 PM
Sets the selected Generator source for PM modulation.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

20. Deviation: (Generate)

This field is active when the selected source is FM or PM modulation type. This controls the deviation of the modulated source. Value range: 0.00 to 100.0 kHz for FM and 0.00 to 10.0 Rad for PM. *For deviation of DATA, 3.2 kHz is the recommended default value.*

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

21. Modulation:

This field is active when the selected source is AM modulation type. This controls the modulation of the selected source. Value range: 0.0% to 100.0%.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

22. Frequency:

This field is active when the selected source, GEN1 or GEN2, is modulated. This selects the Audio Frequency of the selected Function Generator source (sine wave). Value range: 0.0 Hz to 20000.0 Hz.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

23. Subaud dev:

This field is active when the selected source, DATA, is modulated. This controls the deviation of the sub-audible data used during an established call initiated from the Radio Simulator. Value range: 0.00 to 100.0 kHz. *Should be ≤ Deviation (20). The recommended default value is 0.70 kHz.*

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

24. Code:

This field is active when the selected source, DTMF, is modulated. This allows the entry of desired DTMF digits to use for DTMF source generation.

F1 CLEAR
Clears out any DTMF digits previously programmed in.

F2 CONT
Puts the DTMF Generation in the continuous mode.

F3 BURST
Used to one-shot the DTMF Generator source.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

25. Sinad:

This field is used to select a meter to read signals from the Audio/Data/ SINAD input baseband jack. The measurements appear to the right of this field. Valid selections:

Soft Function Keys available with this function include:

F1 DIST
Selects the Distortion meter for baseband measurements.

F2 SINAD
Selects the SINAD meter for baseband measurements.

F3 AF LVL
Selects the AF Level meter for baseband measurements.

F4 OFF
Disables baseband measuring.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

When baseband measurements are made, all receiver measurements including the DSP data decoding are disabled due to hardware limitations. Therefore an EDACS Call Processing cannot be made with any baseband measurements enabled. The Call Processing must be made first, then the baseband measurements may be enabled during the call.

7-14-9 EDACS TRUNKING OPERATIONAL NOTES

This section provides some notes and hints on operating the EDACS Trunking Option of the COM-120B unit.

Squelch Setting

The squelch knob setting on the COM-120B unit is very important for all testing.

While in the EDACS Trunking Main Screen with no RF being transmitted into the COM-120B unit, turn the squelch knob full counter-clockwise. The green squelch light is ON. Slowly turn the knob clockwise until the green light just goes off (make sure there is no flickering). This setting is valid for all EDACS testing.

Control/Working Channels

If a radio is having trouble locking onto the Repeater Simulator, completing calls or the Radio Simulator is showing NC, check the programming of the Control and/or Working Channels in the Setup menu. These channels must be valid for the particular system under test.

Data Generation

If the radio won't lock onto the Repeater Simulator, won't stay up when being called or the Radio Simulator is having trouble completing calls, check the DATA Mod Source. It must be set for FM Modulation. The recommended deviation is 3.2 kHz with a sub-audible deviation of 0.70 kHz.

Logical/Group ID

If a radio can not be called in the Repeater Simulator or can not make a call in the Radio Simulator, check the Group/Logical ID. The Group ID must valid for the system under test.

FM-Zero

If a radio is having trouble completing a Group Call (maybe works 50% of the time), an FM-Zero (FMZ) operation may be necessary. Do this in the Automatic Test using FMZ Soft Function Key F4 while in the idle state, or do it in any manual mode simulator by cursoring to the Deviation field in the left column and pressing FMZ Soft Function Key F3.

Measuring Radio High-Speed Data Deviation

The radio's high-speed data deviation is available in the Automatic Test as a 1 shot measurement, but sometimes a manual measurement is desirable (like when trying to adjust the radio's high-speed data deviation). Accomplish this by using the Repeater Simulator (Manual Test) and cursoring to the 'Extended Meas:' field and pressing SCOPE Soft Function Key F1. Once in the extended scope screen, the Detector input source is selected by cursoring to the 'Cplg' field and pressing Detect Soft Function Key F6. The COM-120B receiver is selected for the scope showing deviation in kHz. Place the scope in one-shot mode by cursoring to the 'Trig Type' field and pressing 1 SHOT Soft Function Key F3. The trigger level should be set high enough so a false trigger will not occur (maybe 1-2 divisions above the center line). The vertical scale could be set to 1 or 2 kHz and the sweep speed set to 1 mS or a little less. Key-up the radio (PTT). The scope should trigger and the high-speed data should appear on the scope grid. The peak-to-peak deviation of the high-speed data displays. Press the START/STOP Control Key on the COM-120B to re-arm the 1 shot trigger on the scope.

APPENDICES

APPENDIX A - USER I/O CONNECTORS AND PIN-OUT TABLES

A-1 TABLE OF I/O CONNECTORS

CONNECTOR NAME	CONNECTOR TYPE	SIGNAL IN/OUT	SIGNAL TYPE
T/R	"N" TYPE	IN/OUT	RF, 200 W MAX
SCOPE/DVM	BNC	IN	Analog, 200 Vdc MAX
DEMOD	BNC	OUT	Audio
AUDIO/DATA GEN	BNC	OUT	Audio
AUDIO/DATA IN	BNC	IN	Analog, Digital 30 V MAX
EXT MOD	BNC	IN	Analog, 20 V MAX
MIC/ACC	8 Pin DIN	IN/OUT	See Pin-Out Table
AUX RF OUT	BNC	OUT	RF
ANTENNA	BNC	IN	RF, 10 mW MAX
AC LINE IN	AC Power In	IN	120/240 VAC
DC IN		OUT	12-30 Vdc
GPIB (IEEE-488)	24 Pin Champ	IN/OUT	See Pin-Out Table
RS-232	9 Pin, D	IN/OUT	See Pin-Out Table
EXTERNAL REFERENCE	BNC	IN	10 MHz >0dB

Table of I/O Connectors

A-2 PIN-OUT TABLE FOR MIC/ACC CONNECTOR

Pin Number	Signal Name	Signal Type	I/O
1	PTT-Out	TTL	Programmable Out
2	Mic Audio	Audio	In
3	Demod Audio	Audio	Out
4	ACC-2	TTL	Programmable In
5	+15 Vdc	10-15 Vdc, 1 mA	Out
6	ACC-1	TTL	Programmable In
7	Mic Switch	TTL	Programmable In
8	GND		

Pin-Out for MIC/ACC Connector Table

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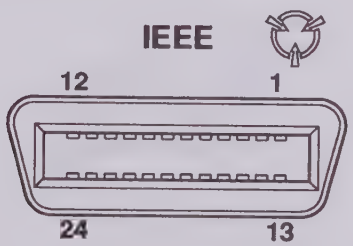
MIC/ACC Connector Pin Identification

A-3 PIN-OUT TABLE FOR GPIB CONNECTOR

Pin Number	Assignment	Pin Number	Assignment
1	DIO 1	10	SRO
2	DIO 2	11	ATN
3	DIO 3	12	Digital GND
4	DIO 4	13	DIO 5
5	EOI	14	DIO 6
6	DAV	15	DIO 7
7	NFRD	16	DIO 8
8	NDAC	17	REN
9	IFC	18-24	Digital GND

Pin-Out for GPIB Connector Table



8618016

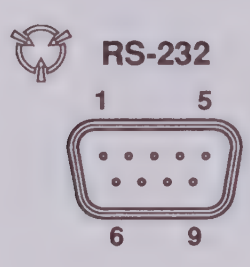
GPIB Pin Identification

Use of the GPIB Connector is in compliance with ANSI/IEEE Standard 488.2-1987.

A-4 PIN-OUT FOR RS-232 CONNECTOR

Pin Number	Assignment
1	4.7 kΩ + 15Vdc
2	TX DATA
3	RX DATA
4	N/C
5	Digital GND
6	4.7 kΩ + 15Vdc
7	CTS
8	RTS
9	N/C

Pin-Out for RS-232 Connector Table



8618017

RS-232 Connector Pin Identification

APPENDIX B - ABBREVIATIONS

A	
A	Ampere
ac	Alternating Current
AF	Audio Frequency
A Freq	Audio Frequency
AGC	Automatic Gain Control
AM	Amplitude Modulation
amp	Ampere
ANLZ	Analyzer
ANSI Institute	American National Standards
ANT	Antenna
AR	Autorange
ASCII	American National Standard Code for Information Interchange
Atten	Attenuation
Auto	Automatic
AUX	Auxiliary
B	
BFO	Beat Frequency Oscillator
BER	Bit Error Rate
bps	Bits per second
C	
Cbl Flt	Cable Fault
CCH	Control Channel
ccw	Counterclockwise
Cont	Continued
CRT	Cathode Ray Tube
C (Cont'd)	
CW	Continuous Wave
C Wt	C-Weight
D	
DAC	Digital to Analog Converter
DCS	Digital Coded Squelch
dB	Decibels
dBm	Decibels relative to 1 milliwatt
dc	Direct Current
DCS	Digital Coded Squelch Codes
Demod Audio	Demodulated Audio
Dev	Deviation
Disp	Display
Dist	Distortion
div	Division(s)
DMM	Digital Multimeter
DPL	Duplex
DPLX	Duplex
DTMF	Dual Tone Multi-Frequency
Dup	Duplex
E	
EDACS	Enhanced Digital Access Communication System
ERR	Error
ESC	Escape
ESD	Electrostatic discharge
EXT MOD	External

	F
Fig	Figure
FM	Frequency Modulation
Folw	Follow
freq	Frequency
Func	Function
Func Gen	Function Generator
	G
G-Scan	RF Generator Scan
Gen	Generator
GND	Ground
GPIB	General Purpose Interface Bus
	H
Hz	Hertz
Hex	Hexadecimal
Horiz	Horizontal
	I
Id	Identification
IF	Intermediate Frequency
IEEE	Institute of Electrical and Electronic Engineers
I/O	Input/Output
	K
kbps	Kilobits per second
kHz	Kilohertz (1000 Hertz)
	L
L-lim	Lower Limit
Lmt	Limit
	L
LSB	Single Sideband Lower
lvl	Level
	M
M-Freq	Audio Frequency
MHz	Megahertz (1000000 Hertz)
MIC	Microphone Source
Mkr	Marker
mod	Modulation
modul	Modulation
ms	Millisecond
MTRS	Meters
mV	Millivolt
mW	Milliwatt
	N
Neg	Negative
	O
OFST	Offset Frequency
	P
PH	Peak Hold
PM	Phase Modulation
Pos	Positive
PROG	Program
PWR	Power (switch)

	R
RCL	Recall
Rcvr	Receiver
Recap	Recapture
	R
Ref	Reference
Res	Resolution
Ret	Return
RF	Radio Frequency
RF Pwr Lvl	RF Power Level
R freq	Receiver Frequency
RMS	Root Mean Square
Rx	Duplex Receiver (Transmitting) Frequency
	S
SCRN	Screen
SCSI	Small Computer System Interface
sec	Second
SGL	Single
SIG	Signal Strength
SQLCH	Squelch
SSB	Single Side Band
	T
TERM	Terminal
T Freq	Duplex Transmitter Frequency
	T (Cont'd)
Tone Rem	Tone Remote
Trig	Trigger
Trk	Tracking
Tx	Duplex Transmitter (Receiving) Frequency
	U
U-lim	Upper Limit
USB	Single Sideband Upper
UUT	Unit Under Test
	V
V	Volt
VAC	Alternating current voltage
VChan	Voice Channel
Vdc	Direct current voltage
Vert	Vertical
VOL	Volume
VRMS	Voltage Root Mean Square
	W
W	Watt

APPENDIX C - REPACKING FOR SHIPPING

C-1 SHIPPING INFORMATION

IFR Test Sets returned to factory for calibration, service or repair must be repackaged and shipped subject to the following conditions:

C-1-1 AUTHORIZATION

Do not return any products to factory without authorization from IFR Customer Service Department.

CONTACT: IFR Systems, Inc.
Customer Service Dept.
10200 West York Street
Wichita, Kansas 67215-8935

Telephone: 800-835-2350
FAX: 316-524-2623

C-1-2 TAGGING TEST SETS

All test sets must be tagged with:

- Owner's identification and address.
- Nature of service or repair required.
- Model No. and Serial No.

C-1-3 SHIPPING CONTAINERS

Test Sets must be repackaged in original shipping containers using IFR packing materials. If original shipping containers and materials are not available, contact IFR Customer Service Department for shipping instructions.

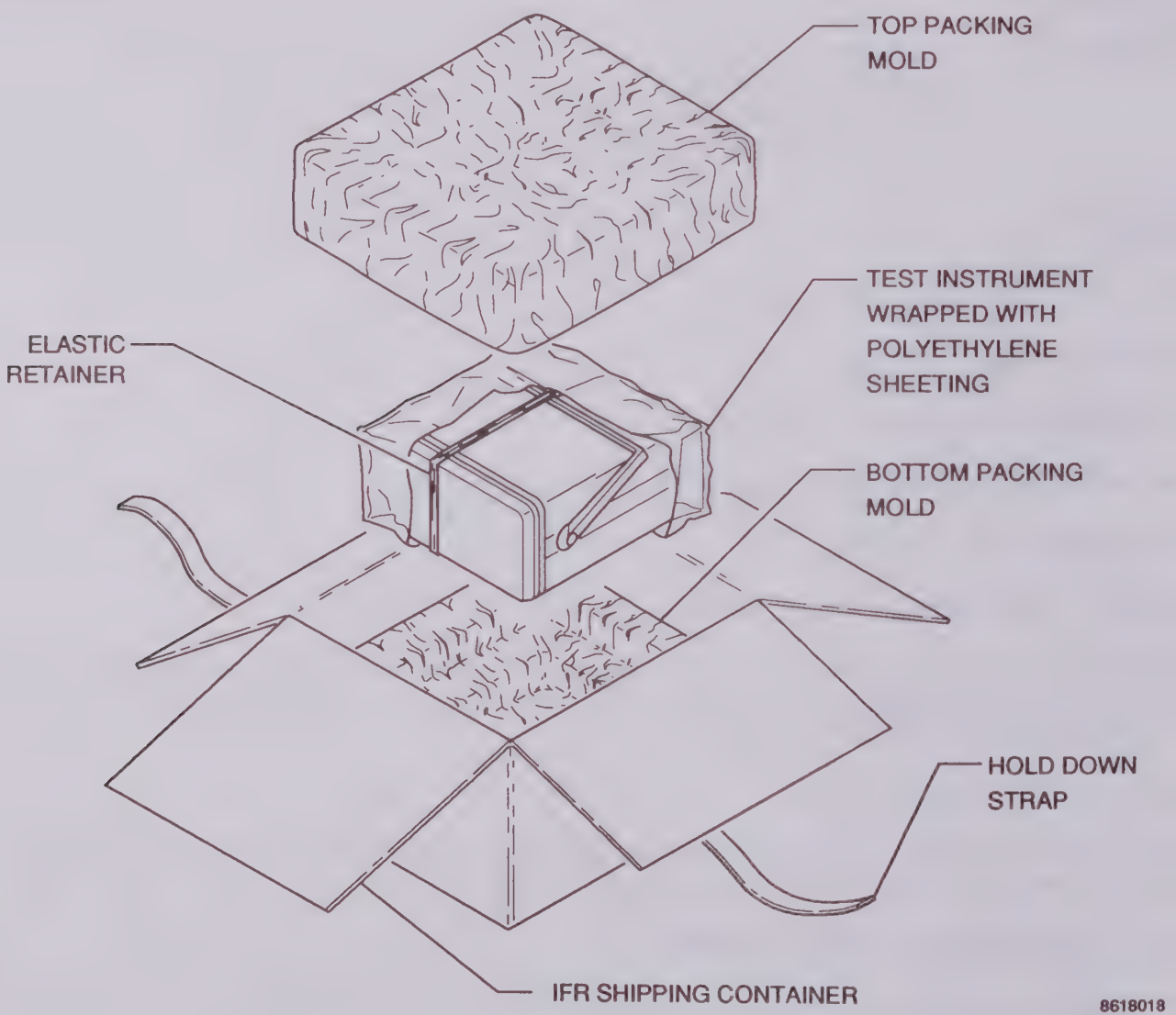
C-1-4 FREIGHT COSTS

All freight costs on non-warranty shipments are assumed by the customer. (See "Warranty Packet" for freight charge policy on warranty claims.)

C-2 REPACKING PROCEDURE

- Make sure bottom packing mold is seated on floor of shipping container.
- Adjust handle to lay unlocked against Test Set as shown.
- Place Elastic Retainer around Test Set to secure handle.
- Carefully wrap Test Set with polyethylene sheeting.

- Place Test Set into shipping container, making sure Test Set is securely seated in bottom packing mold.
- Place top packing mold over top of Test Set and press down until mold rests solidly on bottom packing mold.
- Close shipping container lids and seal with shipping tape or an industrial stapler. Tie all sides of container with break resistant rope, twine or equivalent.



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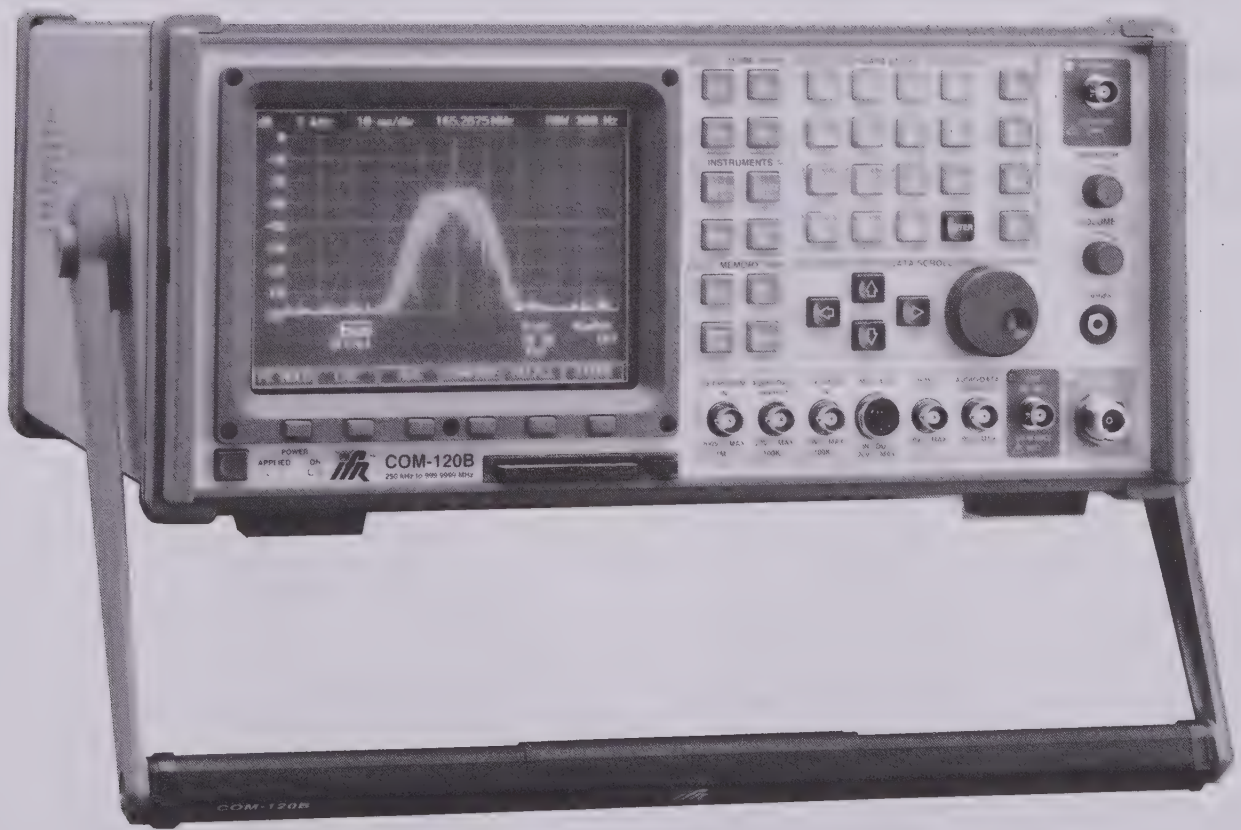
OPERATION MANUAL

COM - 120B

COMMUNICATIONS SERVICE MONITOR



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1002-0601-200
Ver - 3.04
01

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IFR SYSTEMS INC.
Wichita, Kansas

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SYSTEMS, INC.

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LIST OF EFFECTIVE PAGES

The manual changes listed below which are affected by a current change or revision, are so identified by a revision number.

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Revision..... 1 ..... October 20, 1995

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5-4 through 5-5	1
5-6	0
5-7	1
5-8	0
5-9 through 5-11	1
5-12 through 5-13	0
5-14	1
5-15	0
5-16 through 5-23	1
5-24 through 5-27	0
5-28 through 5-30	1
5-31 through 5-33	0
5-34 Blank	0
6-1 through 6-36	0
6-37 through 6-43	1
6-44 Blank	0
7-1 through 7-11	1
7-12 through 7-13	0
7-13a through 7-13h	0
7-13i	1
7-13j through 7-13k	0
7-14	0
7-14a Blank	0
7-15 through 7-103	0
7-104 through 7-122	1
A-1 through A-4	0
B-1 through B-3	0
B-4 Blank	0
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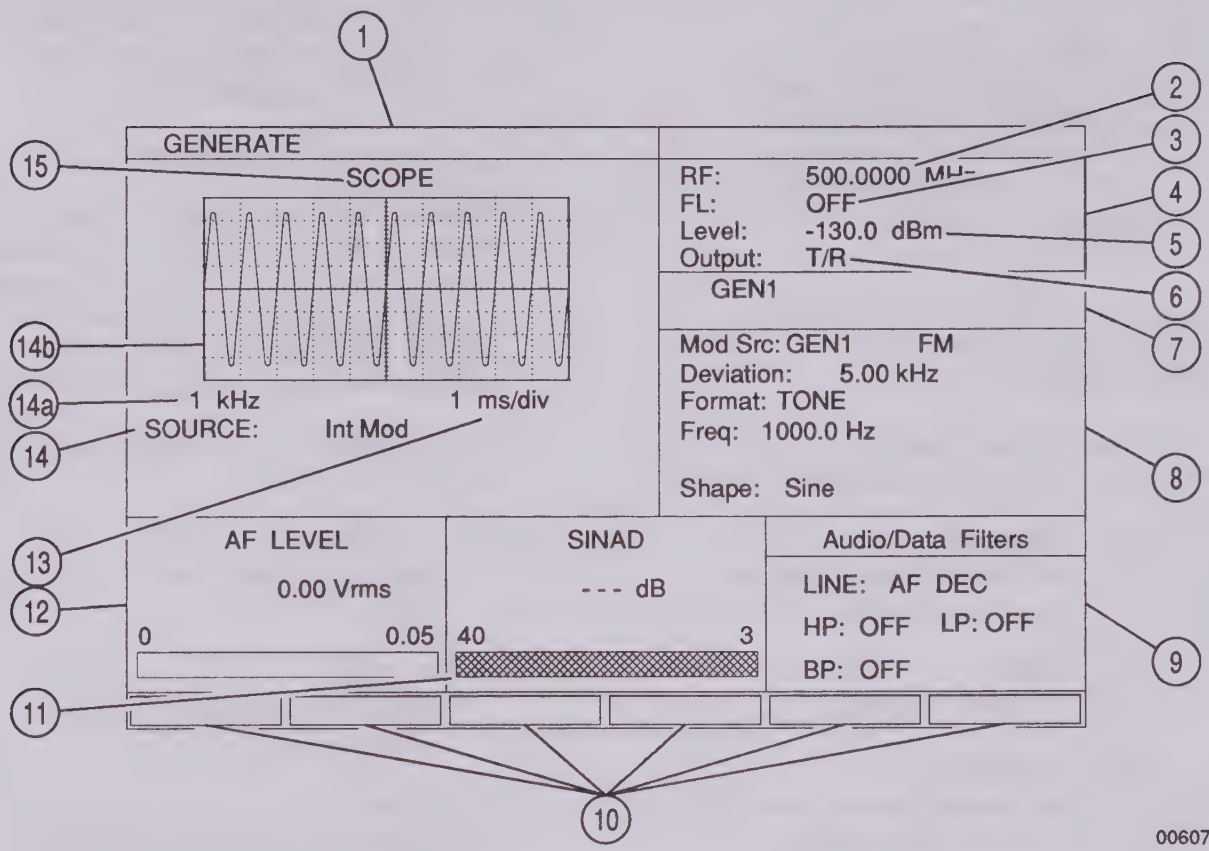
A. RF GENERATE GENERAL OPERATION SCREEN



RF Generator Operation Screen

1. Header Bar

Displays current operation mode.

2. RF Field

Displays current RF Generate Frequency from 0.0000 to 1000.0000 MHz.

Soft Function Keys available with this function include:

F1 Δ=
Accesses window to set RF Field change increment (Δ Freq). With Δ= active, Soft Function Keys are defined as follows:

F6 RETURN
Closes window and returns to normal operation.

F2 Δ On/Off
Toggles Δ Function OFF and ON. If Δ Function is active, "Δ" is displayed by Frequency Readout.

F3 SET REF
Changes frequency in current RF Field to reference frequency. RF Field displays offset from reference frequency when activated. If Set Reference

Function is active, "R" is displayed.

F4 SWEEP
Accesses menu to configure COM-120B RF Generator to sweep specified frequency range. If Sweep Operation is active, Sweep Prompt is displayed.

Set Reference Function and Sweep Function cannot be active simultaneously.

With Sweep Function active, Soft Function Keys are defined as follows:

F1 START
Activates Sweep Function in continuous loop.

F2 STOP
Stops Sweep Function.

F3 SINGLE
Activates Sweep Function for one pass through frequency range.

F5 RESUME
Restarts Sweep Function after STOP Soft Function Key F2 is pressed.

F6 RETURN
Exits Sweep Function into normal RF Generate operation.

F5 LOCK/UNLOCK
Sets frequency used for Receive Operation and Spectrum Analyzer Operation to same frequency as current RF Field. If LOCK Function is active, "L" is displayed and UNLOCK is displayed for F5 definition. Pressing F5, when UNLOCK is displayed, toggles LOCK Function OFF. Editing Frequency in any Operation Screen is reflected in all three Operation Screens when Lock Function is engaged.

3. FL (Frequency List) Setting

Displays selected Frequency List number (FL-00 to FL-99) when active. Blank if inactive. RF Field (3) echoes frequency of selected Frequency List setting. Editing RF Field (3) deactivates Frequency List Function.

Soft Function Keys available with this function include:

F1 On/Off
Toggles active function On and Off.

F2 T-Fwd
Accesses Trunking-Forward Channel List.

F3 T-Rvs
Accesses Trunking-Reverse Channel List.

F4 C-Fwd
Accesses Cellular-Forward Channel List.

F5 C-Rvs
Accesses Cellular-Reverse Channel List.

F6 FL
Accesses User Defined Frequency List.

4. Frequency List Label

Displays optional Frequency List Label. Blank if Frequency List Label is not used.

DTMF/SINAD Low-Pass Filter Field (54) to OFF.

Soft Function Keys available with this function include:

F1 OFF
Deactivates Bandpass Filtering on DTMF/SINAD Line.

F2 C-MSG
Routes DTMF/SINAD Signal through C-Message Weighted Bandpass Filter.

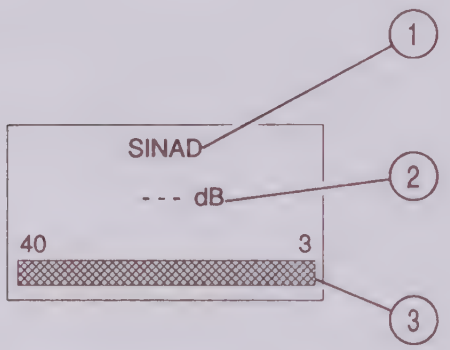
F5 EXEC
Executes all edits made on this screen. Edits made are not valid if EXEC Soft Function Key is not pressed before returning to any other operation mode.

F6 RETURN
Returns to RF Generate Operation Screen.

D. SINAD METER

The SINAD Meter for the RF Generate measures SINAD for a 1 kHz tone passed through the AUDIO/DATA IN Connector. Filtering for the signal passed to the SINAD Meter is provided by the Audio/Data Filters.

Information provided from the RF Generate Operation Screen is displayed as follows:



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1. SINAD/Distortion Meter Label

   Displays label for selected Meter Operation. Selections include SINAD and Distortion Meters. Refer to para 3-3-1(E) for description of Distortion Meter.

Soft Function Keys available with this function include:

F1 ZOOM
Expands current meter into full-size meter.

F2 SINAD
Selects SINAD Meter as active meter. Not displayed if meter is currently active.

F3 DIST
Selects Distortion Meter as active meter. Not displayed if meter is currently active.

2. Meter Reading

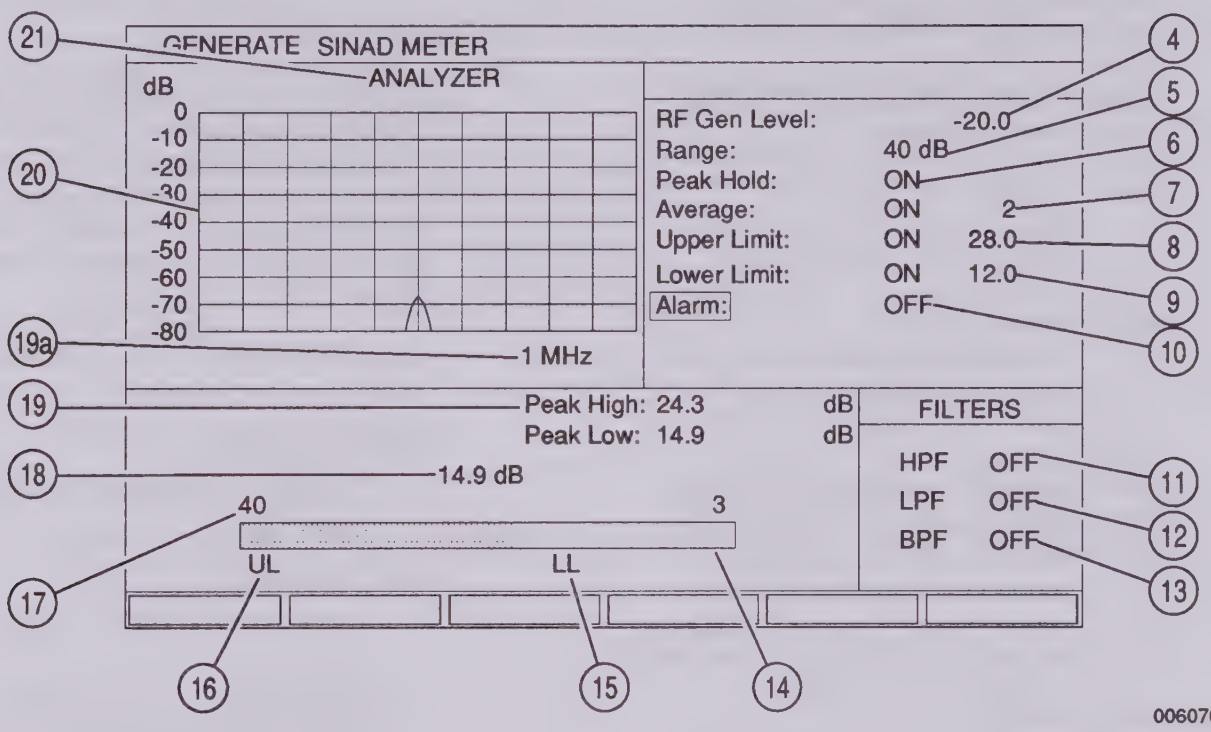
   Displays current SINAD Meter Reading in dB.

3. Meter Bar

   Provides graphic display of current SINAD Meter reading in dB.

Pressing ZOOM Soft Function Key F1 when cursor is at SINAD/Distortion Meter Label (1) accesses full screen SINAD Meter.

Available features and editable fields are listed as follows:



00607080

4. RF Gen Level

Displays Output Level in selected units. If T/R Connector is selected for Output (7), range is -130 to -20 dBm, .07 to 22360.6 µV, 0.0000 to 22.3606 mV and 0.000000 to 0.022360 V. If AUX RF Connector is selected for Output (7), range is -130 to -13 dBm, .07 to 50059.3 µV, 0.0000 to 50.0593 mV and 0.000000 to 0.050059 V.

Soft Function Keys available with this function include:

F1 dBm
Sets Output Level Units to dBm.

F2 uV
Sets Output Level Units to µV.

F3 mV
Sets Output Level Units to mV.

F4 V
Sets Output Level Units to V.

F5 SINAD=
Access field to set SINAD Search Function value.

F5 S=On/Off
Toggles SINAD Search Function On and Off. SINAD Seach Function changes Output Level to search for SINAD= value from UUT. S= Prompt is displayed with function ON.

5. Range

Displays selected SINAD Meter Upper Range. Selections include Autorange, 15 dB and 40 dB.

Soft Function Keys available with this function include:

F1 15 dB
Selects 15 dB as active upper range for SINAD Meter.

F2 40 dB
Selects 40 dB as active upper range for SINAD Meter.

F3 AUTO
Selects Autorange as active upper range for SINAD Meter. This setting automatically adjusts to a higher or lower upper range if signal increases or decreases to a specified level of the current setting.

F5 RST PK
Resets Peak Readings displayed to 0.

F6 RETURN
Returns Test Set to RF Generate Operation Screen.

6. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. When ON, Peak Readings (19) are displayed. Invalid in Autorange.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to RF Generator Operation Screen.

7. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages selected number of readings and reports average as Digital Readout. Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to RF Generator Operation Screen.

8. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0 to 40 dB. When ON, Upper Limit Bar (16) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to RF Generator Operation Screen.

9. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range is 0 to 40 dB. When ON, Lower Limit Bar (15) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to RF Generator Operation Screen.

10. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (8) or is below Lower Limit (9).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to RF Generator Operation Screen.

11. High-Pass Filter (HPF)

Displays current High-Pass Filter setting for SINAD Meter.

12. Low-Pass Filter (LPF)

Displays current Low-Pass Filter setting for SINAD Meter.

13. Bandpass Filter (BPF)

Displays current Bandpass Filter Setting for SINAD Meter.

14. Bar Meter

Relative Graphic display of current SINAD Meter reading.

15. Lower Limit Bar

Indicates position of Lower Limit (9) on Bar Meter (14). If Lower Limit (9) exceeds Range (5), marker is not visible.

16. Upper Limit Bar

Indicates position of Upper Limit (8) on Bar Meter (14). If Upper Limit (8) exceeds Range (5), marker is not visible.

17. Upper Range Limit Readout

Displays current value of Range (4). Redefined as needed if Autorange function is active.

18. Digital Readout

Displays current SINAD Meter Reading.

19. Peak Readings

Displays current high and low Peak Readings when Peak Hold (6) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

19a. Scan Width

Displays current Scan Width. This field is editable. Available Scan Widths include:

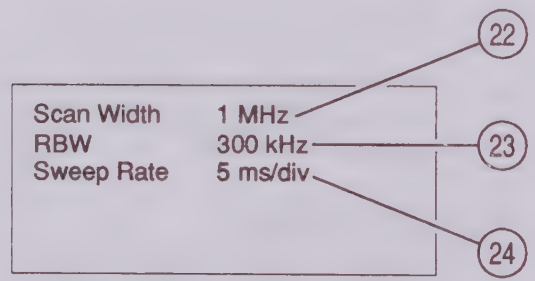
0 kHz	1 kHz	2 kHz
5 kHz	10 kHz	20 kHz
50 kHz	100 kHz	200 kHz
500 kHz	1 MHz	

Soft Function Keys available with this function include:

F1 MENU
Selects a Scan Width pop up menu.

F6 RETURN
Returns to Generate SINAD Meter screen.

F2 CONFIG
Accesses a pop up screen to configure Scan width, RBW (Resolution Bandwidth) and Sweep rate.



00607032

20. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

21. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions.

22. Scan Width

Displays current Analyzer Scan Width. This field is editable. Available Scan Widths include:

0 kHz	1 kHz	2 kHz
5 kHz	10 kHz	20 kHz
50 kHz	100 kHz	200 kHz
500 kHz	1 MHz	

Soft Function Keys available with this function include:

F1 COUPLE
Sets the Sweep and RBW to factory default state for the current scan width.

F6 RETURN
Returns to Generate SINAD Meter screen.

23. RBW (Resolution Bandwidth

Displays current Analyzer Resolution Bandwidth. This field is editable. Available Resolution Bandwidths include:

300 Hz	3 kHz	30 kHz
300 kHz	3 MHz	

Soft Function Keys available with this function include:

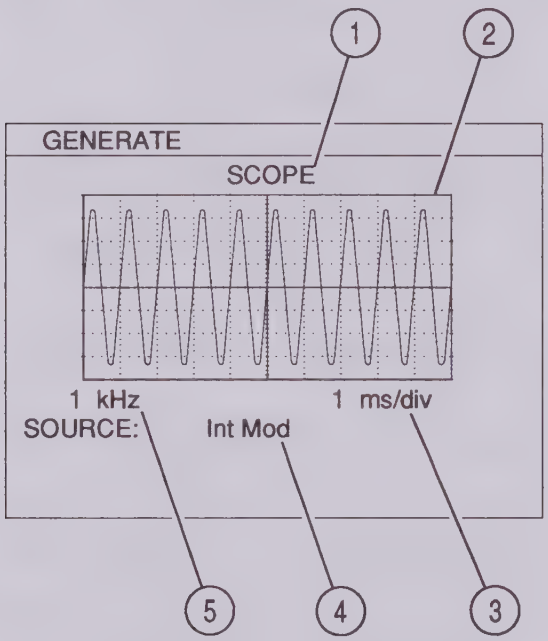
F1 COUPLE
Sets the Sweep and RBW to factory default state for the current scan width.

F2 DEFAULT
Sets only the current field to factory default state for the current scan width.

G. OSCILLOSCOPE OPERATION SCREEN

The abbreviated Oscilloscope, as follows below, is visible from the RF Generate Operation Screen and the following operation screens:

SINAD Meter Operation Screen
Distortion Meter Operation Screen
Audio Frequency Level Meter Operation Screen.



00607004

1. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions.

Soft Function Keys are available on RF Generate Operation Screen only:

F1 ZOOM
Accesses expanded version of active function.

F2 ANALY/SCOPE
Accesses inactive function. If SCOPE is active, displays ANALY. If ANALYZER is active, displays SCOPE.

2. Oscilloscope Screen

Displays digitized trace of specified signal.

3. Sweep

Displays selected Oscilloscope Sweep Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Scale. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into Generate Operation Screen.

F2 ROLL
Views the scope trace in a roll mode when the selected sweep rate is 100 ms/Div or higher.

F2 SLOW
Returns to the normal mode of operation.

4. SCOPE SOURCE

Displays selected Oscilloscope Source. Selections include:

Source	Signal Input	Signal Type
Scope/DVM-GND	SCOPE/DVM Connector	External GND-Coupled Signal
Scope/DVM-AC	SCOPE/DVM Connector	External AC-Coupled Signal
Scope/DVM-DC	SCOPE/DVM Connector	External DC-Coupled Signal
Ext Mod	EXT MOD IN Connector	External Modulation
Notch Residual	Internal Filtered Signal	Notch Filtered Signal passed to SINAD and Distortion Meters. Reading is relative with no units applied.
Audio/Data In	AUDIO/DATA IN Connector	External Audio or Data Signal
Int Mod	Internal Modulation	Composite Modulation Signal generated by Internal Audio/Data Generators

Soft Function Keys available with this function include:

F1 MENU
Accesses MENU to set active Oscilloscope Source. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into Generate Operation Screen without changing Source.

5. Oscilloscope Scale

Displays selected Oscilloscope Vertical Scale. Selections available differ with different SCOPE SOURCE (4). Scales for each SCOPE SOURCE (4) are as follows:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
Ext Mod	100, 200, 500 mV/Div 1, 2, 5 V/Div
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data In	100, 200, 500 mV/Div 1, 2, 5 V/Div
Int Mod GEN1 FM >25 kHz:	 1, 2, 5, 10, 20, 50 kHz/Div
GEN1 FM 2.5 to 12.75 kHz:	1, 2, 5, 10, 20, 50 kHz/Div

8. Marker Position

Displays current Marker Position if Marker (14) is active or OFF if inactive. Value for Marker Position is in same units as Sweep (6) with Trigger point as reference.

Soft Function Keys available with this function include:

F1 ON/OFF
Toggles Marker (14) between ON and OFF.

9. Trigger Type

Displays current Trigger Type. Selections include Auto, One Shot and Normalized.

Soft Function Keys available with this function include:

F1 NORM
Selects Normalized Trigger Type.

F2 AUTO
Selects Auto as Trigger Type.

F3 1 SHOT
Selects and enables One Shot as Trigger Type.

10. Trigger

Adjusts trigger level as indicated by Trigger Level Indicator (15) when accessed.

11. Mode

Displays selected Operation Mode. Selections include Menu, Average, Pk Hold, Min Hold and Store. Menu displays a menu window with selections Live, Recall, Compare, Live-Ref and Ref-Live. Live displays current signal without modification. Recall displays Stored trace only. Compare displays Stored trace and live trace simultaneously. In Live-Ref, the value of each point of the reference trace is subtracted from the current reading and the result is displayed. In Ref-Live, the value of current reading is subtracted from the stored value and the result is displayed. Both Live-Ref and Ref-Live require a previously stored trace. Average displays average of last four traces. Pk Hold displays and holds the trace peak. Min Hold displays and holds minimum trace. Store places copy of current trace in memory.

Soft Function Keys available with this function include:

F1 MENU
Accesses a Menu with Mode selections.

F1 LIVE
Selects LIVE as Oscilloscope Operation Mode.

F2 RECALL
Selects RECALL as Oscilloscope Operation Mode.

F3 COMPARE
Selects COMPARE as Oscilloscope Operation Mode.

F4 LIVE-REF
Selects LIVE-REF as Oscilloscope Operation Mode.

F5 REF-LIVE
Selects REF-LIVE as Oscilloscope Operation Mode.

F6 RETURN
Exits Menu into Generate Operation Screen.

F2 AVG
Activates/deactivates Average Oscilloscope Operation Mode.

F3 PK HOLD
Activates/deactivates Peak Hold Oscilloscope Operation Mode.

F4 MIN HOLD
Activates/deactivates Minimum Hold Oscilloscope Operation Mode.

F6 STORE
Stores the current trace.

12. H Pos

Displays selected horizontal offset in major divisions. Selections range from -10 to +10 Divisions.

13. V Pos

Accesses vertical position of trace.

14. Marker

User editable Marker controlled using Marker Position (8). Movable through extent of visible screen.

15. Trigger Level Indicator

Indicates level of Oscilloscope Trigger Level. Editable using Trigger (10).

16. Oscilloscope Scale

Displays selected Oscilloscope Vertical Scale. Selections available differ with different Source as set in RF Generate Operation Screen. Scales are as follows:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
Ext Mod	100, 200, 500 mV/Div 1, 2, 5 V/Div
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data In	100, 200, 500 mV/Div 1, 2, 5 V/Div
Int Mod GEN1 FM >25 kHz:	1, 2, 5, 10, 20, 50 kHz/Div
GEN1 FM 2.5 to 12.75 kHz:	1, 2, 5, 10, 20, 50 kHz/Div
GEN1 FM 12.75 to 25 kHz:	.2, .4, 1, 2, 4, 10 kHz/Div
GEN1 FM <2.5 kHz:	.2, .4, 1, 2, 4, 10 kHz/Div
GEN1 PM <2.55 RAD:	.2, .4, 1, 4, 10 kHz/Div
GEN1 PM >2.55 RAD:	1, 2, 5, 10, 20,50 RAD/Div
GEN1 AM:	all settings 20%

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Scale. Soft Function Keys available with this function include:

F1 Set Ref
Adjusts Spectrum Analyzer to an internal reference level at current frequency. Function must be initiated at each new frequency to achieve maximum accuracy.

6. Marker Position

Displays current Marker Position if Marker (12) is active or OFF if inactive. Value for Marker Position is MHz.

Soft Function Keys available with this function include:

F1 ON/OFF
Toggles Marker (12) between ON and OFF.

7. Marker Level

Displays current Marker Level if Marker (12) is active. Displays Blank if Marker (12) is OFF.

8. Scale

Displays selected Logarithmic Scale for Spectrum Analyzer Vertical Scale (11). Selections are 2 and 10 dB.

F1 10 dB
Selects 10 dB Logarithmic Scale for Spectrum Analyzer Vertical Scale (11).

F2 2 dB
Selects 2 dB Logarithmic Scale for Spectrum Analyzer Vertical Scale (11).

9. Reference

Adjusts Spectrum Analyzer Vertical Scale (11) ±10 dB when Scale (8) is set to 10 dB. When Scale (8) is set to 2 dB, adjusts Spectrum Analyzer Vertical Scale (11) through full range, displaying 16 dB window and incrementing in 1 dB steps.

10. Mode

Displays selected Operation Mode. Selections include Menu, Average, Peak Hold, Minimum Hold and Store. Menu displays a menu window with selections Live, Recall, Compare, Live-Ref and Ref-Live. Live displays current signal without modification. Recall displays Stored trace only. Compare displays Stored trace and live trace simultaneously. In Live-Ref, the value of each point of the reference trace is subtracted from the current reading and the result is displayed. In Ref-Live, the value of current reading is subtracted from the stored value and the result is displayed. Both Live-Ref and Ref-Live require a previously stored trace. Average displays average of last four traces. Pk Hold displays and holds the trace peak. Min Hold displays and holds minimum trace. Store places copy of current trace in memory.

Soft Function Keys available with this function include:

F1 MENU
Accesses a Menu with Mode selections.

F1 LIVE
Selects LIVE as Spectrum Analyzer Operation Mode.

F2 RECALL
Selects RECALL as Spectrum Analyzer Operation Mode.

F3 COMPARE
Selects COMPARE as Analyzer Spectrum Operation Mode.

F4 LIVE-REF
Selects LIVE-REF as Spectrum Analyzer Operation Mode.

F5 REF-LIVE
Selects REF-LIVE as Spectrum Analyzer Operation Mode.

F6 RETURN
Exits Menu into Generate Operation Screen.

F2 AVG
Activates/deactivates Average Spectrum Analyzer Operation Mode.

F3 PK HOLD
Activates/deactivates Peak Hold Spectrum Analyzer Operation Mode.

F4 MIN HOLD
Activates/deactivates Minimum Hold Spectrum Analyzer Operation Mode.

F6 STORE
Selects STORE as Spectrum Analyzer Operation Mode.

11. Vertical Scale

Provides logarithmic scale for Spectrum Analyzer. Position is controlled by Reference (9).

12. Marker

User editable Marker controlled using Marker Position (6).

13. Zero Scan Sweep

Displays selected Sweep per division. Selections include:

200 µs/div	500 µs/div	1 ms/div
2 ms/div	5 ms/div	10 ms/div
20 ms/div	50 ms/div	100 ms/div
200 ms/div	500 ms/div	

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Scan Width. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into Generate Analyzer Screen.

F5 DEFLT
Sets only the current field to factory default.

F6 COUPLE
Sets the sweep and RBW to factory default state for the current scan width.

14. Scan Width

Displays selected Scan Width per division. Selections include zero scan and:

1 kHz	2 kHz	5 kHz
10 kHz	20 kHz	50 kHz
100 kHz	200 kHz	500 kHz
1 MHz	2 MHz	5 MHz
10 MHz	20 MHz	50 MHz
100 MHz		

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Scan Width. Soft Function Keys available with this function include:

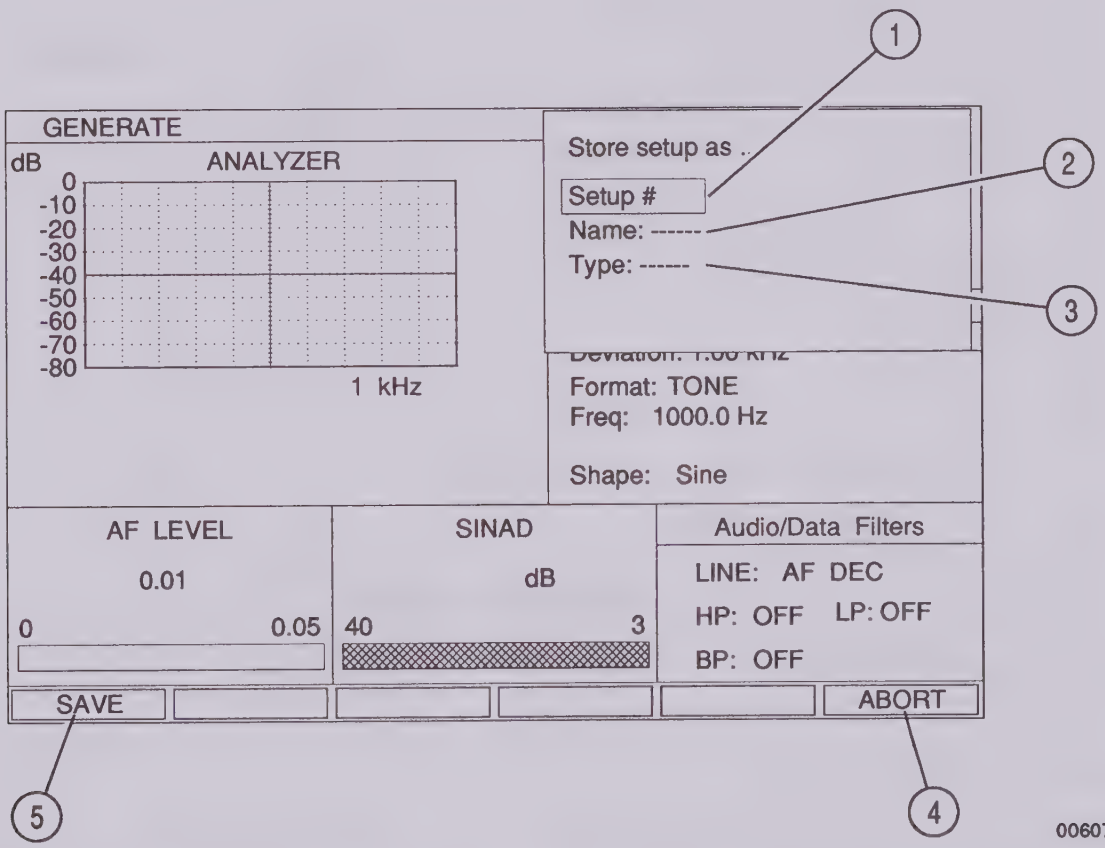
F6 RETURN
Exits Menu into Generate Analyzer Screen.

F6 COUPLE
Sets the sweep and RBW to factory default state for the current scan width.

I. STORE AND RECALL OPERATION

Pressing STORE Memory Key allows the operator to store up to 50 RF Generate Operation Screen configurations. Storage Locations 0 through 49 can be used to store an RF Generate Operation configuration, RF Receive Operation configuration or Duplex Operation configuration (Receive and Generate pair).

Pressing STORE Memory Key when in RF Generate Operation Screen accesses the following fields:



00607081

1. Setup #

Displays selected Memory Location for storage of current configuration.

2. Name

Displays optional alphanumeric label for selected Memory Location.

3. Type

Displays the type of data currently saved in the specified setup number. Available types to save and recall are: DUPLEX, GENERATOR, RECEIVER, GENERATOR & RECEIVER and EMPTY.

4. ABORT Soft Function Key F6

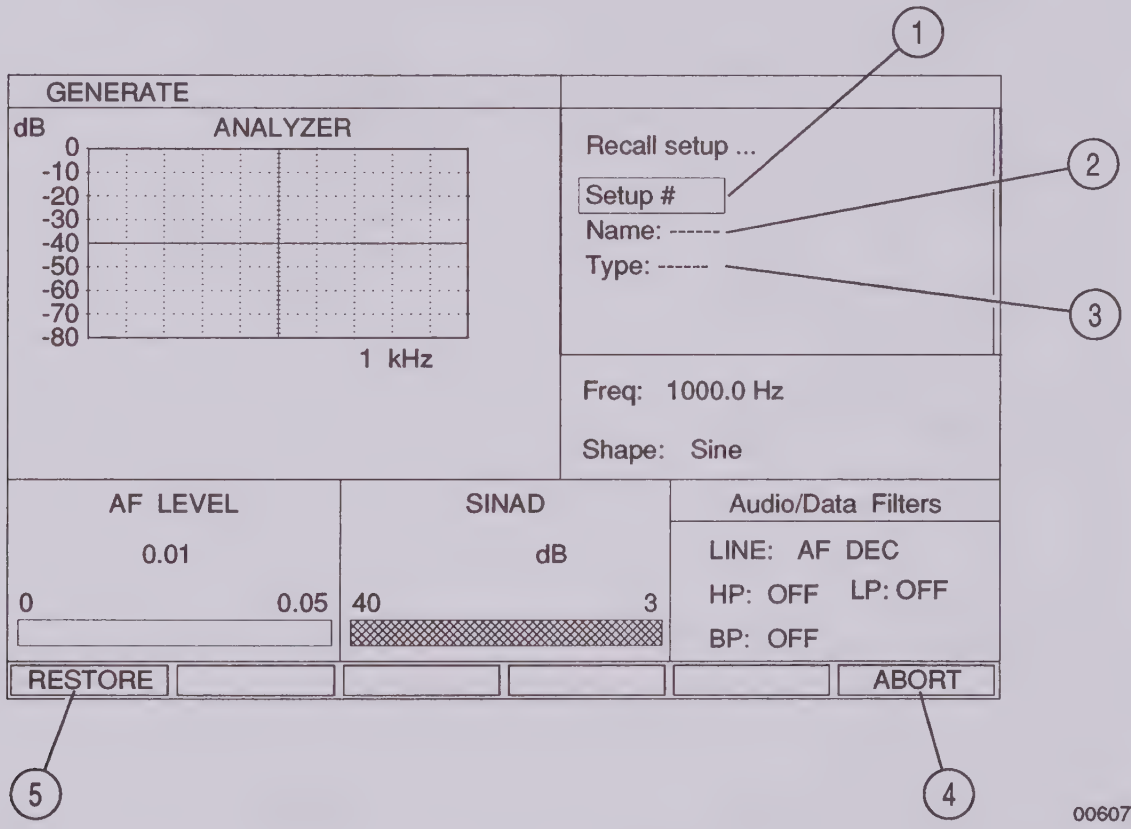
Escapes Storage Operation without performing edit. SAVE Soft Function Key F1 (5) or ABORT Soft Function Key F6 must be pressed to return to normal operation.

5. SAVE Soft Function Key F1

Finalizes Storage Operation. SAVE Soft Function Key F1 or ABORT Soft Function Key F6 (4) must be pressed to return to normal operation.

Pressing RCL Memory Key allows the operator to recall up to 50 previously stored operation screens. RF Receive, RF Generate or Duplex Operation Screen configurations can all be accessed from the RF Generate Operation Screen. Accessing anything other than an RF Generate Operation Screen configuration, automatically switches the COM-120B to the selected mode of operation.

Pressing RCL Memory Key when in RF Generate Operation Screen accesses the following fields:



00607082

1. Setup #

   Displays selected Memory Location for recall of stored configuration.

2. Name

   Displays optional alphanumeric label for selected Memory Location.

3. Type

   Displays the type of data saved in the specified setup number. Available types to save and recall are: DUPLEX, GENERATOR, RECEIVER, GENERATOR & RECEIVER and EMPTY.

4. ABORT Soft Function Key F6

Escapes Storage Operation without performing edit. RESTORE Soft Function Key F1 (5) or ABORT Soft Function Key F6 must be pressed to return to normal operation.

5. RESTORE Soft Function Key F1

Finalizes Recall Operation. RESTORE Soft Function Key F1 or ABORT Soft Function Key F6 (4) must be pressed to return to normal operation.

50. FORMAT

Displays selected Signalling Format for decoding. Selections are limited to USER for standard configuration. Additional selections are shown, but are unusable unless Option 09 or Option 11 is installed. Additional selections available include:

TONE	CCIRH
TONE REMOTE	CCIRH4
USER	NATEL
EEA	EURO
EIA	5/6 TONE
ZVEI	10 PS
DZVEI	20 PS
DDZVEI	MTS
CCIR	

Soft Function Keys available with this function include:

F1 MENU
Displays Menu of Signalling Format selections.

F2 DECODE
Activates Decode Function. Field is highlighted when Decode Function is active.

F3 PG UP
Pages screen up to view decoded information.

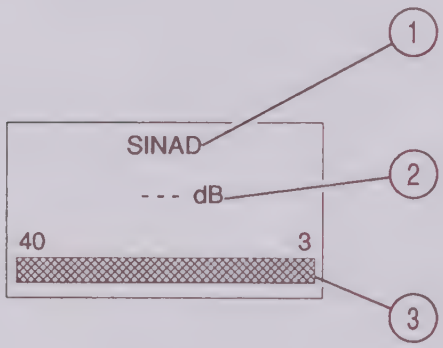
F4 PG DN
Pages screen down to view decoded information.

F6 RETURN
Returns to RF Receive Operation Screen.

D. SINAD METER

The RF Receive Operation Screen SINAD Meter measures SINAD for a 1 kHz tone modulation for an RF signal passed to the RF Receiver. The RF signal is demodulated and filtered before being passed to the SINAD Meter. Filtering for the signal passed to the SINAD Meter is provided by the Audio/Data Filters.

The SINAD Meter can be shown as reading in dB only or as a meter. Information provided from the RF Receive Operation Screen is displayed as follows:



00607079

1. SINAD/Distortion/Modulation Meter Label

   Displays label for selected Meter Operation. Selections include SINAD, Distortion and Modulation Meters.

Soft Function Keys available with this function include:

F1 ZOOM
Expands current meter into full-size meter.

F2 SINAD
Selects SINAD Meter as active meter. Not displayed if meter is active.

F3 DIST
Selects Distortion Meter as active meter. Not displayed if meter is active.

F4 DEV
Selects Modulation Meter associated with Demodulation type as active meter. Not displayed if meter is active.

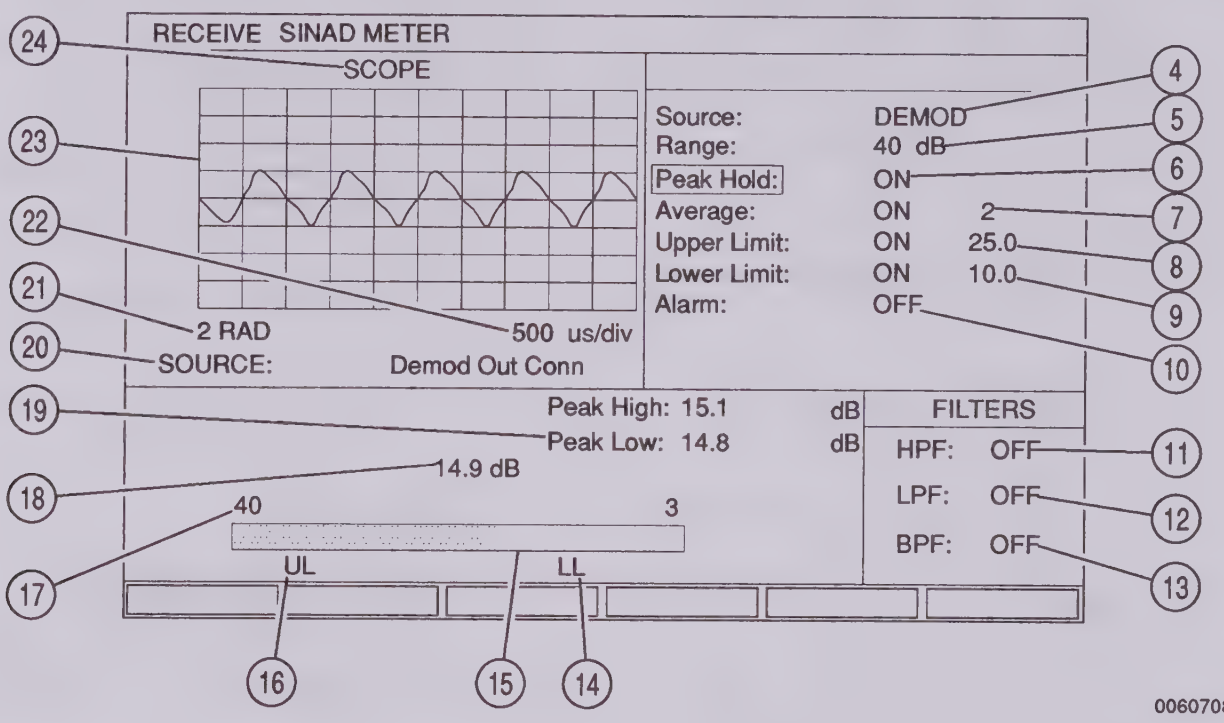
2. Meter Reading

   Displays current SINAD Meter Reading in dB.

3. Meter Bar

   Provides graphical display of current SINAD Meter reading in dB.

Pressing ZOOM Soft Function Key F1 when cursor is at SINAD/Distortion/Modulation Meter Label (1) accesses full screen SINAD Meter. Available features and editable fields are as follows:



00607083

4. Source

Displays DEMOD, indicating signal source for SINAD measurement is demodulated signal. Field is for display only.

5. Range

Displays selected SINAD Meter Upper Range. Selections include Autorange, 15 dB and 40 dB.

Soft Function Keys available with this function include:

F1 15 dB
Selects 15 dB as active upper range for SINAD Meter.

F2 40 dB
Selects 40 dB as active upper range for SINAD Meter.

F3 AUTO
Selects Autorange as active upper range for SINAD Meter. This setting automatically adjusts to a higher or lower upper range if signal increases or decreases to a specified level of the current setting.

F5 RST PK
Resets Peak Readings displayed to 0.

F6 RETURN
Returns Test Set to normal RF Receive Operation Screen.

6. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. Remains OFF in Autorange. When ON, Peak Readings (19) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

7. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages a selected number of readings and reports average as Digital Readout (18). Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

8. Upper Limit

Displays current status of upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0 to 40 dB. When ON, Upper Limit Bar (16) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

9. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range is 0 to 40 dB. When ON, Lower Limit Bar (14) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

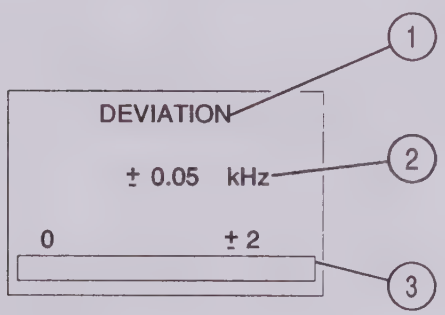
10. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, alarm sounds when signal exceeds Upper Limit (8) or is below Lower Limit (9).

F. FM DEVIATION METER

The FM Deviation Meter for the RF Receive Operation Screen measures FM Deviation for an RF signal passed to the RF Receiver. The RF signal is demodulated and filtered before being passed to the FM Deviation Meter. Filtering for the signal passed to the FM Deviation Meter is provided by the Audio/Data Filters.

The FM Deviation Meter can be shown as reading in kHz only or as a meter. Information provided from the RF Receive Operation Screen is displayed as follows:



00607074

1. SINAD/Distortion/Modulation Meter Label

   Displays label for selected Meter Operation. Selections include SINAD, Distortion and Modulation Meters.

Soft Function Keys available with this function include:

F1 ZOOM
Expands current meter into full-size meter.

F2 SINAD
Selects SINAD Meter as active meter. Not displayed if meter is active.

F3 DIST
Selects Distortion Meter as active meter. Not displayed if meter is active.

F4 DEV
Selects Modulation Meter associated with Demodulation type as active meter. Not displayed if meter is active.

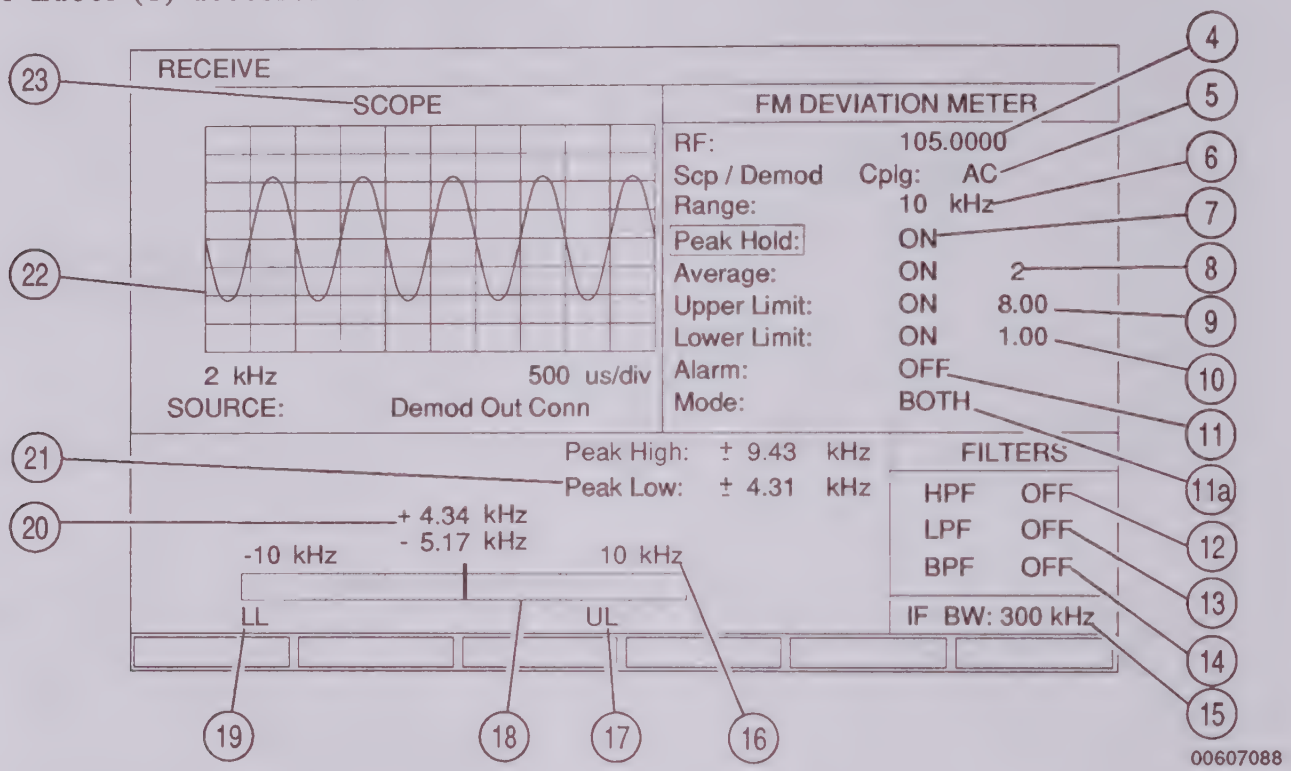
2. Meter Reading

   Displays current FM Deviation Meter Reading in kHz.

3. Meter Bar

   Provides graphical display of current FM Deviation Meter reading in kHz.

Pressing ZOOM Soft Function Key F1 when cursor is at SINAD/Distortion/Modulation Meter Label (1) accesses full screen FM Deviation Meter. Available features and editable fields are as follows:



4. RF

Displays selected RF Receiver Frequency. Selections range from .000 to 1000 MHz.

5. Scope/DEMOD Connector Coupling

Displays selected coupling for Oscilloscope and DEMOD Connector. Selections are AC or DC.

Soft Function Keys available with this function include:

F1 AC
Selects AC Coupling for Oscilloscope and DEMOD Connector.

F2 DC
Selects DC Coupling for Oscilloscope and DEMOD Connector.

F5 FM-Z
Automatically calibrates FM Zero.

F6 RETURN
Returns unit to RF Receive Operation Screen.

6. Range

Displays selected FM Deviation Meter Upper Range. Selections include Autorange and the following:

2 kHz	5 kHz	10 kHz
20 kHz	50 kHz	100 kHz

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Scale.

F2 AUTO
Selects Autorange for Deviation Meter Range.

F5 RST PK
Resets Peak Deviation Meter readings.

F6 RETURN
Returns unit to RF Receive Operation Screen.

7. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. Remains OFF in Autorange. When ON, Peak Readings (21) are displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

8. Average

Displays current status of Averaging Function and number of samples when active. Status is OFF or ON. Averaging Function averages selected number of readings and reports average as Digital Readout (20). Range is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

9. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range is 0 to 99.99 kHz. When ON, Upper Limit Bar (17) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Upper Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

10. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range is 0 to 99.99 kHz. When ON, Lower Limit Bar (19) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Lower Limit Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

11. Alarm

Displays current status of Alarm Function. Status is OFF or ON. When ON, Audible alarm sounds when signal exceeds Upper Limit (9) or is below Lower Limit (10).

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Alarm Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

11a. Mode

Toggles the Deviation Meter between the standard mode (+/- div by 2) and peak mode (+ and - peak deviation as two seperate readings/bars).

Soft Function Keys available with this function include:

F1 NORM
Selects Normal for +/- peak div by 2.

F2 BOTH
Selects + and - peak deviation. The upper limit applies to the largest peak Positive reading and the lower limit applies to the largest Negative reading. For Peak Hold readings, Peak Hi applies to the largest Positive peak reading found and Pead Lo applies to the largest Negative reading found.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Normal RF Receiver Operation.

12. High-Pass Filter (HPF)

Displays current High-Pass Filter setting for FM Deviation Meter.

13. Low-Pass Filter(LPF)

Displays current Low-Pass Filter setting for FM Deviation Meter.

14. Bandpass Filter (BPF)

Displays current Bandpass Filter setting for FM Deviation Meter.

15. IF Bandwidth

Displays selected IF Bandwidth. Selections include 15 and 300 kHz.

Soft Function Keys available with this function include:

F1 300 kHz
Selects 300 kHz bandpass filter as active filter.

F2 15 kHz
Selects 15 kHz bandpass filter as active filter.

16. Upper Range Limit Readout

Displays current value of Range (6). Redefined as needed if Autorange function is active.

17. Upper Limit Bar

Indicates position of Upper Limit (9) on Bar Meter (18). If Upper Limit (9) exceeds Range (6), marker is not visible.

18. Bar Meter

Relative Graphic display of current FM Deviation Meter reading. Displays NORM (+/- div by 2) or BOTH (+ and - peak deviation).

19. Lower Limit Bar

Indicates position of Lower Limit (10) on Bar Meter (18). If Lower Limit (10) exceeds Range (6), marker is not visible.

20. Digital Readout

Displays current FM Deviation Meter Reading.

21. Peak Readings

Displays current high and low Peak readings when Peak Hold (7) is set to ON. Readings are reinitialized when RST PK Soft Function Key F5 is pressed.

22. SCOPE/ANALYZER Screen

Displays digitized trace of specified signal as Oscilloscope or Spectrum Analyzer.

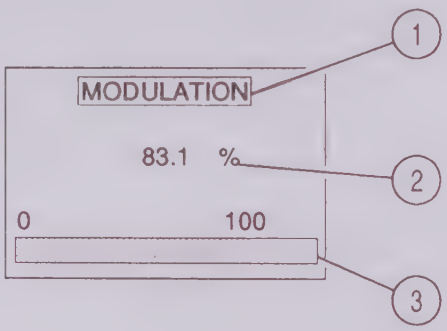
23. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions.

G. AM MODULATION METER

The AM Modulation Meter for the RF Receive Operation Screen measures AM Modulation for an RF signal passed to the RF Receiver. The RF signal is demodulated and filtered before being passed to the AM Modulation Meter. Filtering for the signal passed to the AM Modulation Meter is provided by the Audio/Data Filters.

The AM Modulation Meter can be shown as reading in % only or as a meter. Information provided from the RF Receive Operation Screen is displayed as follows:



8717058

1. SINAD/Distortion/Modulation Meter Label

   Displays label for selected Meter Operation. Selections include SINAD, Distortion and Modulation Meters.

   Soft Function Keys available with this function include:

   F1 ZOOM
   Expands current meter into full-size meter.

   F2 SINAD
   Selects SINAD Meter as active meter. Not displayed if meter is currently active.

   F3 DIST
   Selects Distortion Meter as active meter. Not displayed if meter is currently active.

   F4 DEV
   Selects Modulation Meter associated with Demodulation type as active meter. Not displayed if meter is currently active.

2. Meter Reading

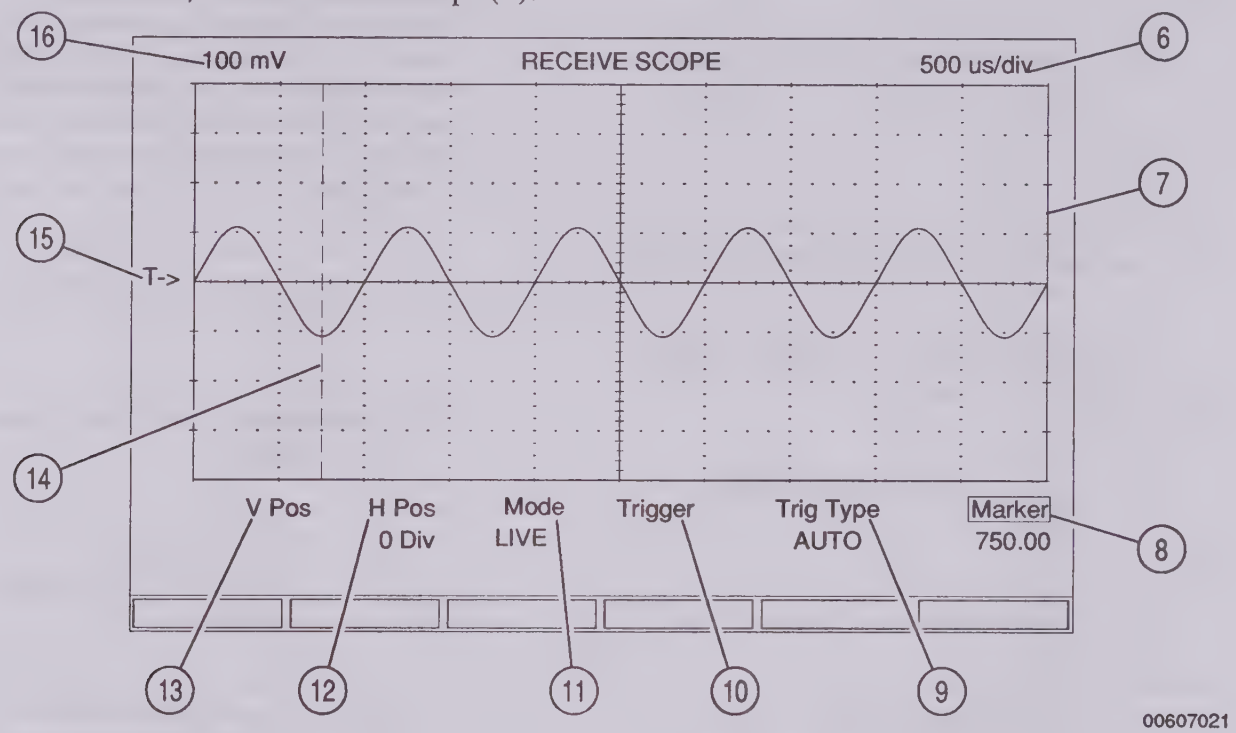
   Displays current AM Modulation Meter Reading in % Modulation.

3. Meter Bar

   Provides graphical display of current AM Modulation Meter reading in % Modulation.

Pressing ZOOM Soft Function Key F1 accesses full screen Oscilloscope, when cursor is on SCOPE/ANALYZER Prompt (1).

Available features and parameters are as follows:



6. Sweep

Displays selected Oscilloscope Sweep. Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Sweep.

F6 RETURN
Exits Menu into normal operation.

F2 ROLL
Views the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.

F2 SLOW
Returns to the normal mode of operation.

7. Oscilloscope Screen

Displays digitized trace of specified signal.

8. Marker Position

Displays Marker Position if Marker (14) is active or OFF if inactive. Value for Marker Position is in same units as Sweep (6) with Trigger Level (15) as reference.

Soft Function Keys available with this function include:

F1 On/Off
Toggles Marker (14) between On and Off

9. Trigger Type

Displays Trigger Type. Selections include Auto, One Shot and Normalized.

Soft Function Keys available with this function include:

F1 NORM
Selects Normalized Trigger Type.

F2 AUTO
Selects Auto as Trigger Type.

F3 1 SHOT
Selects One Shot as Trigger Type. Pressing 1 Shot Soft Function Key reenables Trigger.

10. Trigger

Adjusts trigger level as indicated by Trigger Level Indicator (15) when accessed.

11. Mode

Displays selected Operation Mode. Selections include Menu, Average, Pk Hold, Min Hold and Store. Menu displays a menu window with selections Live, Recall, Compare, Live-Ref and Ref-Live. Live displays current signal without modification. Recall displays Stored trace only. Compare displays Stored trace and live trace simultaneously. In Live-Ref, the value of each point of the reference trace is subtracted from the current reading and the result is displayed. In Ref-Live, the value of current reading is subtracted from the stored value and the result is displayed. Both Live-Ref and Ref-Live require a previously stored trace. Average displays average of last four traces. Pk Hold displays and holds the trace peak. Min Hold displays and holds minimum trace. Store places copy of current trace in memory.

Soft Function Keys available with this function include:

F1 MENU
Accesses a Menu with Mode selections.

F1 LIVE
Selects LIVE as Oscilloscope Operation Mode.

F2 RECALL
Selects RECALL as Oscilloscope Operation Mode.

F3 COMPARE
Selects COMPARE as Oscilloscope Operation Mode.

F4 LIVE-REF
Selects LIVE-REF as Oscilloscope Operation Mode.

F5 REF-LIVE
Selects REF-LIVE as Oscilloscope Operation Mode.

F6 RETURN
Exits Menu into Generate Operation Screen.

F2 AVG
Activates/deactivates Average Oscilloscope Operation Mode.

F3 PK HOLD
Activates/deactivates Peak Hold Oscilloscope Operation Mode.

F4 MIN HOLD
Activates/deactivates Minimum Hold Oscilloscope Operation Mode.

F6 STORE
Stores the current trace.

12. H Pos

Displays selected horizontal offset in major divisions. Selections range from -10 to +10 Divisions.

13. V Pos

Accesses vertical position of trace.

14. Marker

User editable Marker controlled using Marker Position (8). Movable through extent of visible screen.

15. Trigger Level Indicator

Indicates approximate Oscilloscope Trigger Level. Editable using Trigger (10).

16. Oscilloscope Scale

Displays Oscilloscope Vertical Scale. Selections available differ with different Source. Scales for each SCOPE SOURCE (4) are as follows:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
AF Cntr	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data/Gen Out	20, 40, 100, 200, 400 mV 1 V
DTMF/SINAD	FM DEMOD TYPES: ≤20 kHz 0.1, 0.2, 0.5, 1, 2, 5 kHz ≥20 kHz 0.2, 0.4, 1, 2, 4, 10 kHz 50 kHz 0.5, 1, 2.5, 5, 10, 25 kHz 100 kHz 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE: 20% PM DEMOD TYPE Radians 0.1, 0.2, 0.5, 1, 2, 5
Data Decoder	FM DEMOD TYPES: ≤20 kHz 0.1, 0.2, 0.5, 1, 2, 5 kHz ≥20 kHz 0.2, 0.4, 1, 2, 4, 10 kHz 50 kHz 0.5, 1, 2.5, 5, 10, 25 kHz 100 kHz 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE: 20% PM DEMOD TYPE Radians 0.1, 0.2, 0.5, 1, 2, 5
RF Power	Low, Med, High (Selection is automatic depending on power provided T/R Connector)
Detector Out	FM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians

SCOPE SOURCE (4)	Available Scales
Demod Out Connector	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Mod Meters	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Scale. Soft Function Keys available with this function include:

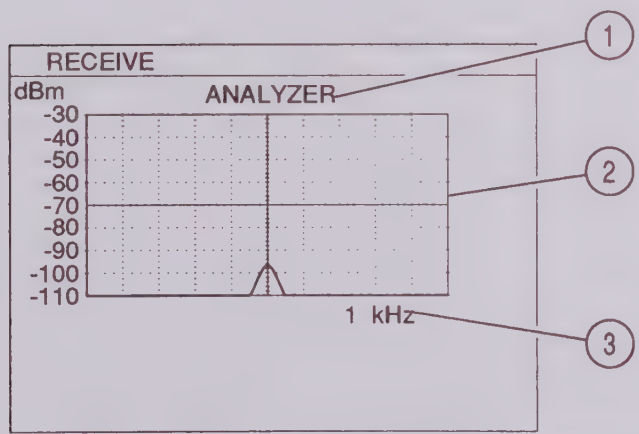
F6 RETURN
Exits Menu to RF Receive Operation Screen.

N. SPECTRUM ANALYZER OPERATION SCREEN

The abbreviated Spectrum Analyzer, as follows, is visible from the RF Receive Operation Screen and the following full-size Meter Operation Screens:

SINAD Meter
Distortion Meter
FM Deviation Meter
AM Modulation Meter
Phase Modulation Meter
RF Power Meter
Receive Level Meter
RF Frequency Error Meter
Audio Frequency Counter

An abbreviated Oscilloscope is available in the same position. All set parameters are reflected in all of the above Operation Screens. Features and parameters of the abbreviated Spectrum Analyzer are as shown:



00607040

1. SCOPE/ANALYZER Prompt

Displays current operation function. Used to toggle between two functions.

Soft Function Keys available with this field include:

F1 ZOOM
Accesses expanded version of active function.

F2 ANALY/SCOPE
Accesses inactive function. If SCOPE is active, displays ANALY. If ANALYZER is active, displays SCOPE.

2. Spectrum Analyzer Screen

Displays digitized trace of specified signal.

3. Scan Width

Displays selected Scan Width per division. Selections include zero scan and:

1 kHz	50 kHz	2 kHz
100 kHz	5 kHz	200 kHz
10 kHz	500 kHz	20 kHz
1 MHz		

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Scan Width. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into normal operation.

F2 CONFIG
Accesses a pop up screen to configure Scan width, RBW

Soft Function Keys available with this function include:

F1 T/R
Selects T/R Connector as RF Input Connector.

F2 ANT
Selects ANTENNA Connector as RF Input Connector.

11. Atten

Displays Attenuation for RF Input (10). Selections include 0 dB and 30 dB.

Soft Function Keys available with this function include:

F1 30 dB
Selects 30 dB Attenuation for RF Input (10).

F2 0 dB
Selects 0 dB Attenuation for RF Input (10).

12. Mode

Displays selected Operation Mode. Selections include Menu, Average, Peak Hold, Minimum Hold and Store. Menu displays a menu window with selections Live, Recall, Compare, Live-Ref and Ref-Live. Live displays current signal without modification. Recall displays Stored trace only. Compare displays Stored trace and live trace simultaneously. In Live-Ref, the value of each point of the reference trace is subtracted from the current reading and the result is displayed. In Ref-Live, the value of current reading is subtracted from the stored value and the result is displayed. Both Live-Ref and Ref-Live require a previously stored trace. Average displays average of last four traces. Pk Hold displays and holds the trace peak. Min Hold displays and holds minimum trace. Store places copy of current trace in memory.

Soft Function Keys available with this function include:

F1 MENU
Accesses a Menu with Mode selections.

F1 LIVE
Selects LIVE as Spectrum Analyzer Operation Mode.

F2 RECALL
Selects RECALL as Spectrum Analyzer Operation Mode.

F3 COMPARE
Selects COMPARE as Analyzer Spectrum Operation Mode.

F4 LIVE-REF
Selects LIVE-REF as Spectrum Analyzer Operation Mode.

F5 REF-LIVE
Selects REF-LIVE as Spectrum Analyzer Operation Mode.

F6 RETURN
Exits Menu into Generate Operation Screen.

F2 AVG
Activates/deactivates Average Spectrum Analyzer Operation Mode.

F3 PK HOLD
Activates/deactivates Peak Hold Spectrum Analyzer Operation Mode.

F4 MIN HOLD
Activates/deactivates Minimum Hold Spectrum Analyzer Operation Mode.

F6 STORE
Stores the current trace.

13. Vertical Scale

Provides scale for Spectrum Analyzer. Position is controlled by Reference (9).

14. Marker

User editable Marker controlled using Marker Position (8).

15. Zero Scan Sweep

Displays selected Sweep per division when Scan Width (16) is set to Zero Scan. Selections include:

200 µs/div	500 µs/div	1 ms/div
2 ms/div	5 ms/div	10 ms/div
20 ms/div	50 ms/div	100 ms/div
200 ms/div	500 ms/div	

16. Scan Width

Displays selected Scan Width per division. Selections include zero scan and:

1 kHz	50 kHz	2 kHz
100 kHz	5 kHz	200 kHz
10 kHz	500 kHz	20 kHz
1 MHz	2 MHz	5 MHz
10 MHz	20 MHz	50 MHz
100 MHz		

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Scan Width. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into normal operation.

F6 COUPLE
Sets the sweep and RBW to factory default state for the current scan width.

17. Logarithmic Function

Displays selected Logarithmic Function for referencing Vertical Scale (13). Selections include dBm, dBµV, dBmV, dBV, dBµW and dBW.

Soft Function Keys available with this function include:

F1 dBm
Selects dBm as Logarithmic Function.

F2 dBµV
Selects dBµV as Logarithmic Function.

F3 dBmV
Selects dBmV as Logarithmic Function.

F4 dBV
Selects dBV as Logarithmic Function.

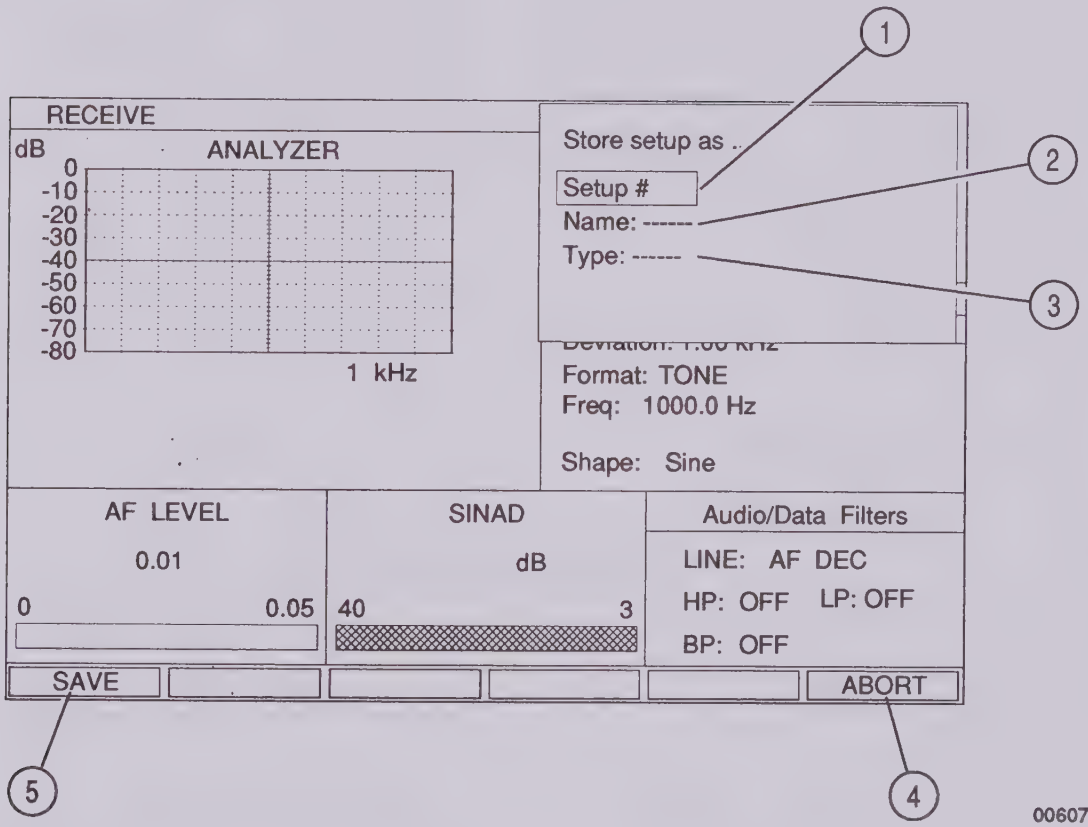
F3 dBµW
Selects dBµW as Logarithmic Function.

F4 dBW
Selects dBW as Logarithmic Function.

O. STORE AND RECALL OPERATION

Pressing STORE Memory Key allows the operator to store up to 50 RF Receive Operation Screen configurations. Storage Locations 0 through 49 can be used to store a RF Generate Operation configuration, a RF Receive Operation configuration or a Duplex Operation configuration (Receive and Generate pair).

Pressing STORE Memory Key while in RF Receive Operation Screen accesses the following fields:



00607084

1. Setup #

Displays selected Memory Location for storage of current configuration.

2. Name

Displays optional alphanumeric label for selected Memory Location.

3. Type

Displays the type of data saved in the specified setup number. Available types to save and recall are: DUPLEX, GENERATOR, RECEIVER, GENERATOR & RECEIVER and EMPTY.

4. ABORT Soft Function Key F6

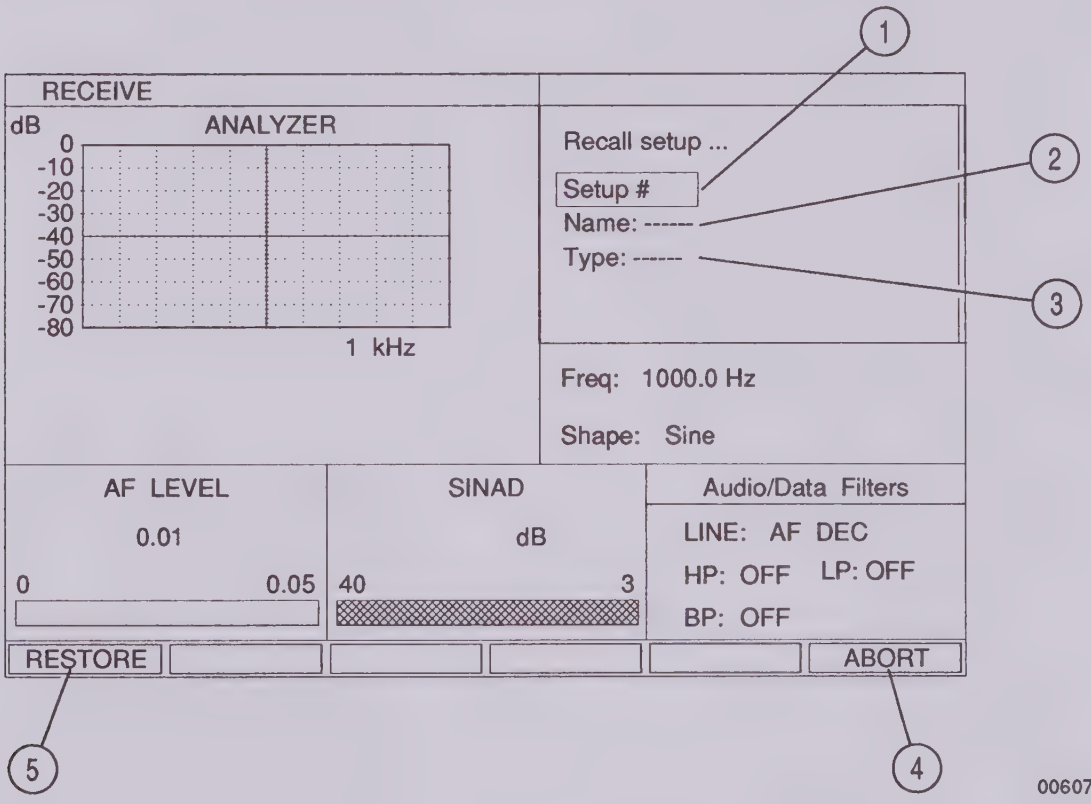
Escapes Storage Operation without performing edit. SAVE Soft Function Key F1 (5) or ABORT Soft Function Key F6 must be pressed to return to normal operation.

5. SAVE Soft Function Key F1

Finalizes Storage Operation. SAVE Soft Function Key F1 or ABORT Soft Function Key F6 (4) must be pressed to return to normal operation.

Pressing RCL Memory Key allows the operator to recall up to 50 previously stored operation screens. RF Receive, RF Generate or Dupex Operation Screen configurations and all be accessed from the RF Generate Operation Screen. Accessing anything other than an RF Generate Operation Screen configuration, automatically switches the COM-120B to the selected mode of operation.

Pressing RCL Memory Key while in RF Receive Operation Screen accesses the following fields:



00607085

1. Setup #

   Displays selected Memory Location for recall of stored configuration.

2. Name

   Displays optional alphanumeric label for selected}emory Location.

3. Type

   Displays the type of data saved in the specified setup number. Available types to save and recall are: DUPLEX, GENERATOR, RECEIVER, GENERATOR & RECEIVER and EMPTY.

4. ABORT Soft Function Key F6

Escapes Storage Operation without performing edit. RESTORE Soft Function Key F1 (5) or ABORT Soft Function Key F6 must be pressed to return to normal operation.

5. RESTORE Soft Function Key F1

Finalizes Recall Operation. RESTORE Soft Function Key F1 or ABORT Soft Function Key F6 (4) must be pressed to return to normal operation.

Soft Function Keys available with this function include:

F1 Δ=
Accesses window to set Duplex Receive RF Field change increment. With Δ= active, Soft Function Keys are defined as follows:

F6 RETURN
Closes window and returns to normal operation.

F2 Δ On/Off
Toggles Δ Function OFF and ON. If Δ Function is active,"Δ" is displayed by Frequency Readout.

F5 PAIR/UNPAIR
Toggles PAIR Function ON and OFF. With function active, UNPAIR is displayed. Function Ties Duplex Generate RF Field (3) and Duplex Receive RF Field together as a Pair with specified Frequency Offset (4). With Pair Function active, editing Duplex Generate RF Field (3) changes Duplex Receive RF Field . Editing Frequency Offset (4) or Duplex Receive RF Field changes Duplex Generate RF Field (3).

21. Attenuation

Displays selected attenuation of input signal. Displays either 0 or 30.

Soft Function Keys available with this function include:

F1 30 dB
Selects 30 dB Attenuation.

F2 0 dB
Selects 0 dB Attenuation.

22. Duplex Receive Prompt

Accesses Duplex Receive Operation Screen.

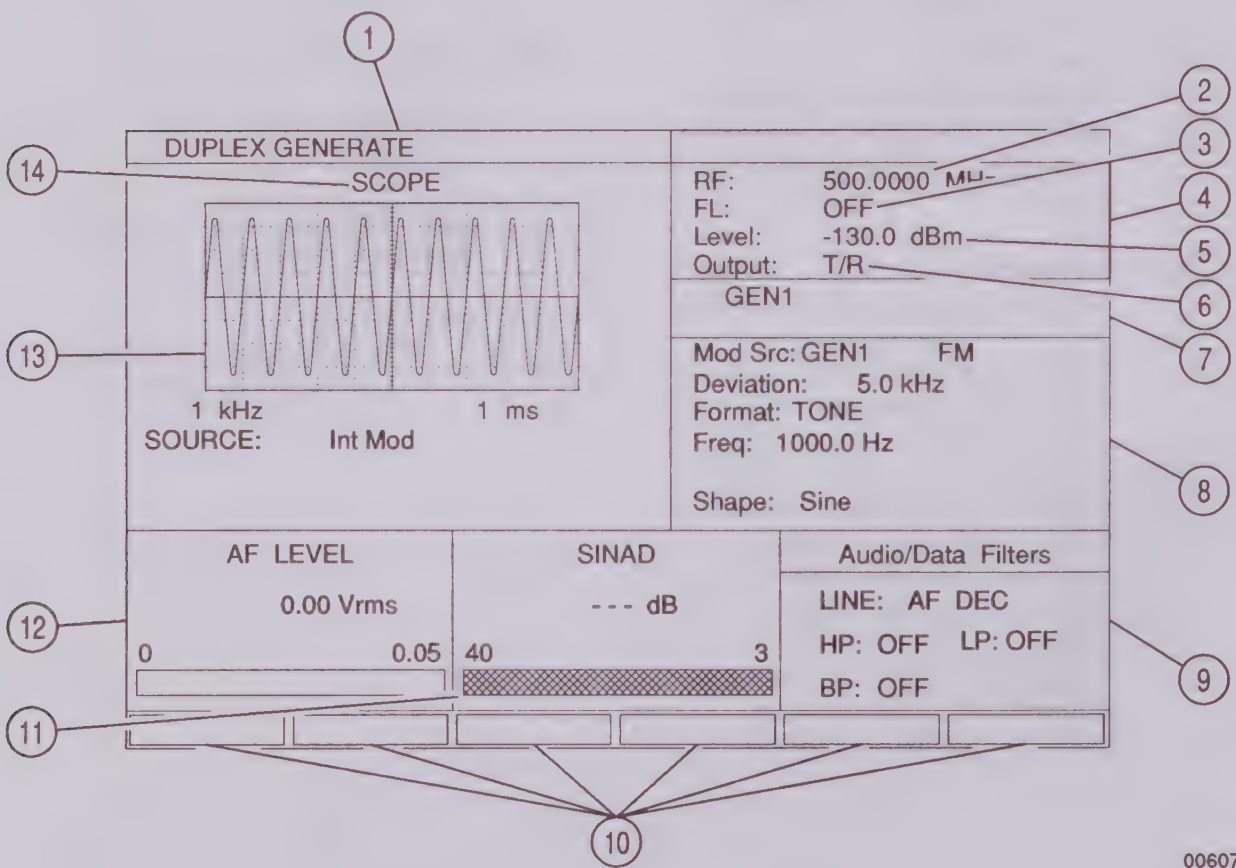
Soft Function Keys available with this function include:

F1 ZOOM
Accesses Duplex Receive Operation Screen.

B. DUPLEX GENERATE GENERAL OPERATION SCREEN

The Duplex Generate Operation Screen is used to define and activate the COM-120B RF Generator for Duplex Operation. The Duplex Generate Operation Screen is accessed by pressing ZOOM Soft Function Key F1 or by pressing ENTER Key while cursor is on the Duplex Generate Prompt on the Duplex Operation Screen.

Features and editable parameters on the Duplex Generate Operation Screen are listed as follows:



Duplex Generate Operation Screen

1. Header Bar

Displays current operation mode.

2. RF Field

Displays current Duplex Generate Frequency from 0.0000 to 1000.0000 MHz.

Soft Function Keys available with this function include:

F1 Δ=
Accesses window to set Duplex Generate RF Field change increment. With Δ= active, Soft Function Keys are defined as follows:

F6 RETURN
Closes window and returns to normal operation.

F2 Δ On/Off
Toggles Δ Function OFF and ON. If Δ Function is active,"Δ" is displayed by Frequency Readout.

F3 SET REF
Makes frequency in current Duplex Generate RF Field reference frequency. Duplex Generate RF Field displays offset from reference frequency when activated. If Set Reference Function is active, "R" is displayed.

F5 PAIR/UNPAIR
Toggles PAIR Function ON and OFF. With function active, UNPAIR is displayed for Soft Function Key field and "P" is displayed next to RF Field. Function ties Duplex Generate RF Field and Duplex Receive Frequency together as Pair with specified Frequency Offset. With Pair Function active, editing Duplex Generate RF Field changes Duplex Receive Frequency.

3. FL (Frequency List) Setting

Displays selected Frequency List number (FL-00 to FL-99) when active. Blank if inactive. RF Field (2) echoes frequency of selected Frequency List setting. Editing RF Field (2) deactivates Frequency List Function.

Soft Function Keys available with this function include:

F1 ON/OFF
Toggles active function ON and OFF.

F2 T-Fwd
Accesses Trunking-Forward Channel List.

F3 T-Rvs
Accesses Trunking-Reverse Channel List.

F4 C-Fwd
Accesses Cellular-Forward Channel List.

F5 C-Rvs
Accesses Cellular-Reverse Channel List.

F6 FL
Accesses User Defined Frequency List.

4. Frequency List Label

Displays optional Frequency List Label if used. Displays Blank if unused.

5. Output Level

Displays Output Level. If T/R Connector is selected for Output (6), range is -130 to -40 dBm, 0 to .002236 V, 0 to 2.2360 mV or 0.07 to 2236.0 µV. If AUX RF Connector is selected for Output (6), range is -130 to -13 dBm, 0 to 0.050059 V, 0 to 50.0593 mV or 0.07 to 50059.3 µV.

Soft Function Keys available with this function include:

F1 dBm
Selects units of dBm for Output Level.

F2 µV
Selects units of µV for Output Level.

F3 mV
Selects units of mV for Output Level.

F4 V
Selects units of V for Output Level.

F5 SINAD=
Access field to set SINAD Search Function value.

F6 S=On/Off
Toggles SINAD Search Function ON and OFF. SINAD Search Function changes Output Level to search for SINAD= value from UUT. S= Prompt is displayed with function ON.

6. Output

Displays Output Connector. Displays T/R, T/R Gate, AUX or AUX Gate. Gated Output is active only when microphone attached to MIC/ACC Connector is keyed.

Soft Function Keys available with this function include:

F1 T/R
Selects T/R Connector as output connector.

F2 AUX
Selects AUX RF OUT Connector as output connector.

F3 T/R Gate
Selects T/R Connector as output connector. Output is only active when microphone, attached to MIC/ACC Connector, is keyed.

F4 AUX Gate
Selects AUX RF OUT Connector as output connector. Output is only active when microphone, attached to MIC/ACC Connector, is keyed.

7. Modulation Source Window

Displays active Modulation Sources. Inactive Modulation Sources are not shown. If two (or more) sections of the RF Modulator are set in conflict (e.g. GEN1 set for PM and GEN2 set for FM, or GEN1 set for 0.01 kHz deviation and GEN2 set for 2.60 kHz deviation) the screen displays the invalid source grayed out.

8. Modulation Source Block

Displays Modulation Source. Selections include GEN1 (Audio Generator 1), GEN2 (Audio Generator 2), DTMF (DTMF Tone Generator), DATA (DATA Generator), EXT (External Modulation) and MIC (Microphone Modulation).

9. AUDIO/DATA FILTERS Block

Displays current filter information for selected analog signal. Selections include AF Decode Line, Data Decode Line and Speaker/Headphones Line.

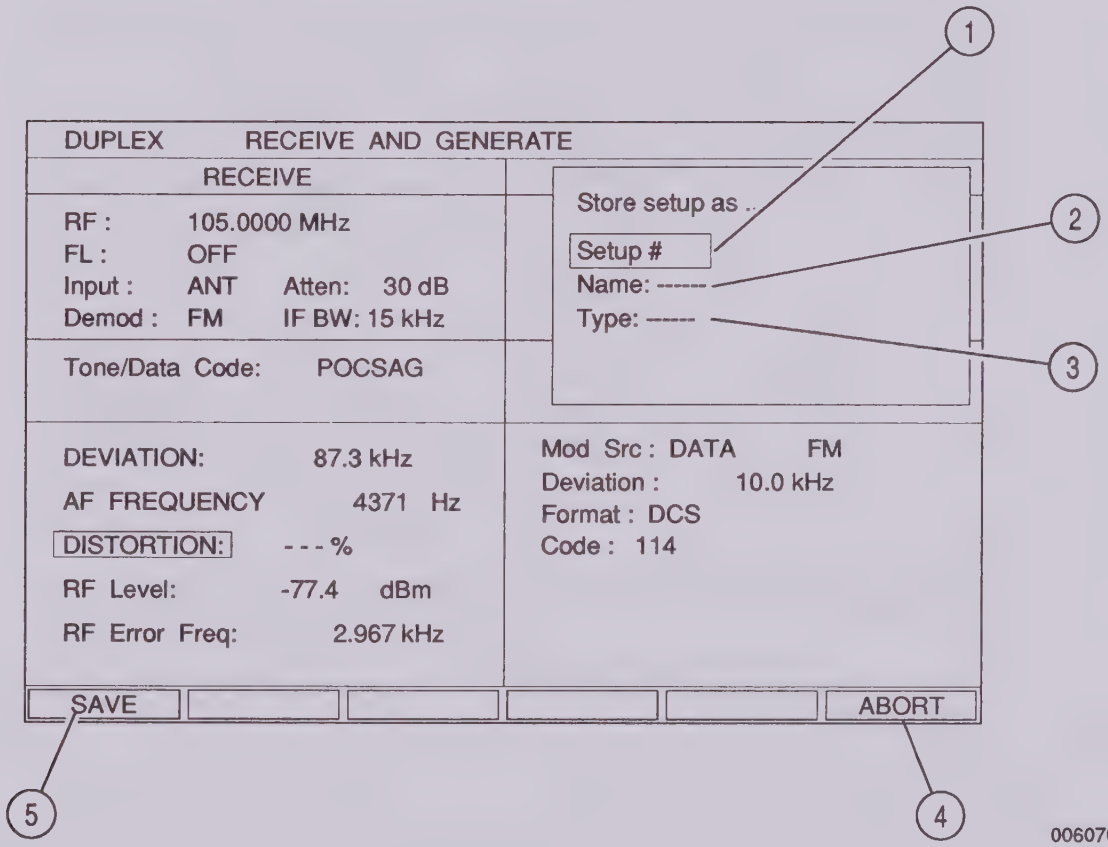
10. Soft Function Key Definitions

Functions are redefined with each field of the current operation screen.

D. STORE AND RECALL OPERATION

Pressing STORE Memory Key allows the operator to store up to 50 Duplex Operation Screen configurations. Storage Locations 0 through 49 can be used to store an RF Generate Operation configuration, RF Receive Operation configuration or Duplex Operation configuration (Receive and Generate pair).

Pressing STORE Memory Key when in Duplex Operation Screen accesses the following fields:



00607044

1. Setup #

Displays selected Memory Location for storage of current configuration.

2. Name

Displays optional alphanumeric label for selected Memory Location.

3. Type

Displays the type of data currently saved in the specified setup number. Available types to save and recall are: DUPLEX, GENERATOR, RECEIVER, GENERATOR & RECEIVER and EMPTY.

4. ABORT Soft Function Key F6

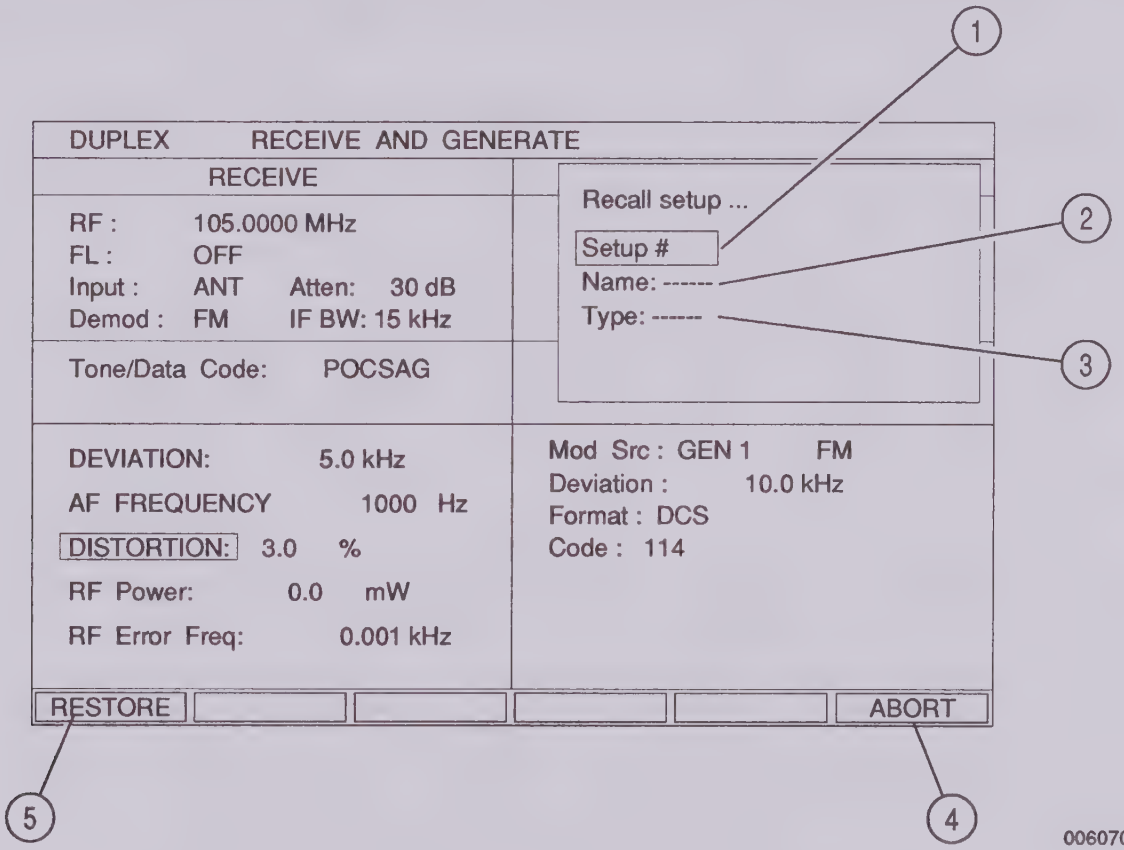
Escapes Storage Operation without editing. Press SAVE Soft Function Key F1 (5) or ABORT Soft Function Key F6 to return to normal operation.

5. SAVE Soft Function Key F1

Finalizes Storage Operation. Press SAVE Soft Function Key F1 or ABORT Soft Function Key F6 (4) to return to normal operation.

Pressing RCL Memory Key allows the operator to recall up to 100 previously stored operation screens. RF Receive, RF Generate or Duplex Operation Screen configurations and all can be accessed from the Duplex Operation Screen. Accessing anything other than a Duplex Operation Screen configuration, automatically switches the COM-120B to the selected mode of operation.

Pressing RCL Memory Key when in Duplex Operation Screen accesses the following fields:



1. Setup #

   Displays selected Memory Location for recall of stored configuration.

2. Name

   Displays optional alphanumeric label for selected Memory Location.

3. Type

   Displays the type of data saved in the specified setup number. Available types to save and recall are: DUPLEX, GENERATOR, RECEIVER, GENERATOR & RECEIVER and EMPTY.

4. ABORT Soft Function Key F6

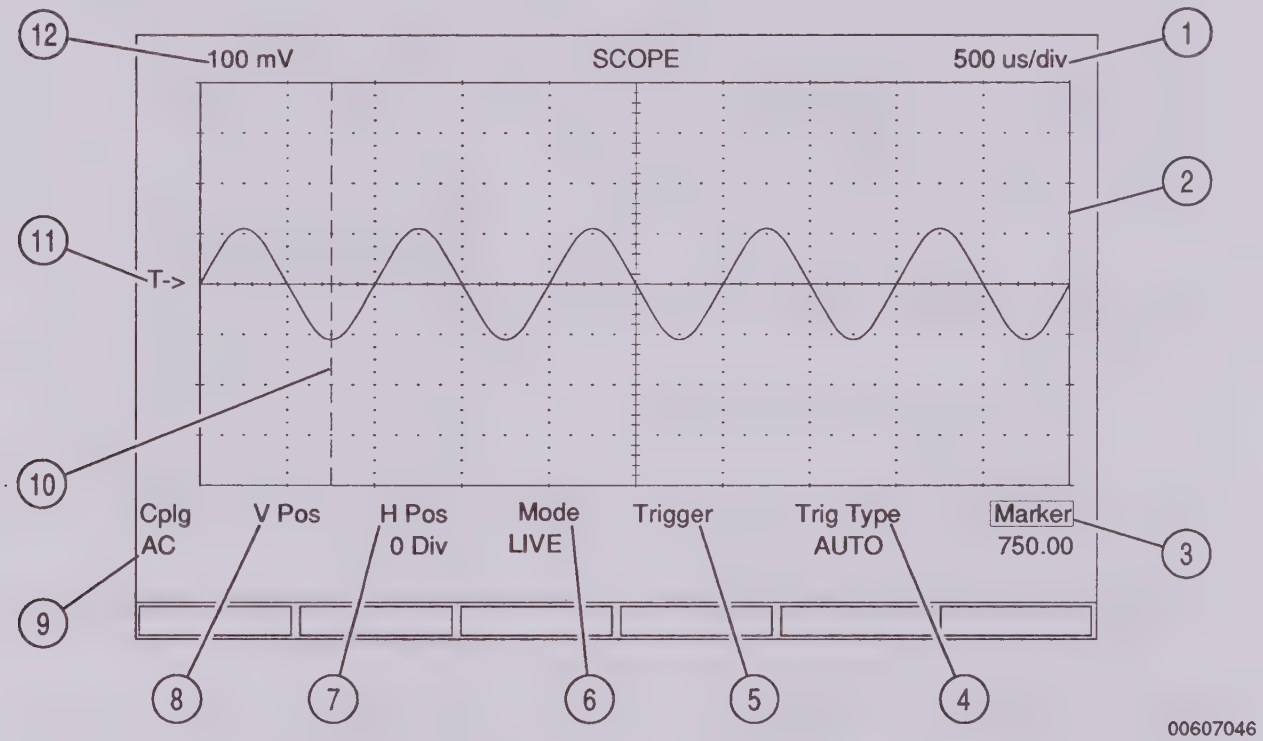
Escapes Storage Operation without performing any edit. Press RESTORE Soft Function Key F1 (5) or ABORT Soft Function Key F6 to return to normal operation.

5. RESTORE Soft Function Key F1

Finalizes Recall Operation. Press RESTORE Soft Function Key F1 or ABORT Soft Function Key F6 (4) to return to normal operation.

3-3-4 OSCILLOSCOPE OPERATION SCREEN

The Independent Oscilloscope Operation Screen operates as an independent piece of test equipment. Input for Oscilloscope Operation is through the SCOPE/DVM Connector. The Oscilloscope Operation Screen is accessed by pressing the SCOPE Instruments Key. When accessed, the Oscilloscope Operation Screen is set up in the configuration last used.



Oscilloscope Operation Screen

1. Sweep

Displays selected Oscilloscope Sweep. Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Scale.

F6 RETURN
Exits Menu into normal operation.

F2 ROLL
Views the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.

F2 SLOW
Returns to the normal mode of operation.

2. Oscilloscope Screen

Displays digitized trace of specified signal.

3. Marker Position

Displays current Marker Position if Marker (10) is active or OFF if inactive. Value for Marker Position is in same units as Sweep (1) with Trigger point as reference.

Soft Function Keys available with this function include:

F1 On/Off
Toggles Marker (10) between ON and OFF.

4. Trigger Type

Displays selected Trigger Type. Selections include Auto, One Shot and Normalized.

Soft Function Keys available with this function include:

F1 NORM
Selects Normalized as Trigger Type.

F2 AUTO
Selects Auto as Trigger Type.

F3 1 SHOT
Selects One Shot as Trigger Type. Pressing 1 SHOT Soft Function Key reenables Trigger.

5. Trigger

Adjusts trigger level as indicated by Trigger Level Indicator (11) when accessed.

6. Mode

Displays selected Operation Mode. Selections include Menu, Average, Pk Hold, Min Hold and Store. Menu displays a menu window with selections Live, Recall, Compare, Live-Ref and Ref-Live. Live displays current signal without modification. Recall displays Stored trace only. Compare displays Stored trace and live trace simultaneously. In Live-Ref, the value of each point of the reference trace is subtracted from the current reading and the result is displayed. In Ref-Live, the value of current reading is subtracted from the stored value and the result is displayed. Both Live-Ref and Ref-Live require a previously stored trace. Average displays average of last four traces. Pk Hold displays and holds the trace peak. Min Hold displays and holds minimum trace. Store places copy of current trace in memory.

Soft Function Keys available with this function include:

F1 MENU
Accesses a Menu with Mode selections.

F1 LIVE
Selects LIVE as Oscilloscope Operation Mode.

F2 RECALL
Selects RECALL as Oscilloscope Operation Mode.

F3 COMPARE
Selects COMPARE as Oscilloscope Operation Mode.

F4 LIVE-REF
Selects LIVE-REF as Oscilloscope Operation Mode.

F5 REF-LIVE
Selects REF-LIVE as Oscilloscope Operation Mode.

F6 RETURN
Exits Menu into Generate Operation Screen.

F2 AVG
Activates/deactivates Average Oscilloscope Operation Mode.

F3 PK HOLD
Activates/deactivates Peak Hold Oscilloscope Operation Mode.

F4 MIN HOLD
Activates/deactivates Minimum Hold Oscilloscope Operation Mode.

F6 STORE
Stores the current trace.

7. H Pos

Displays selected horizontal offset in major divisions. Selections range from -10 to +10 Divisions.

8. V Pos

Accesses vertical position of trace. Trace above or below screen is indicated by straight line trace at top or bottom graticule.

9. Coupling

Displays selected Oscilloscope Coupling. Selections include AC, DC and GND (Ground).

Soft Function Keys available with this function include:

F1 GND
Selects GND (Ground) as Oscilloscope Coupling.

F2 AC
Selects AC as Oscilloscope Coupling.

F3 DC
Selects DC as Oscilloscope Coupling.

10. Marker

User editable Marker controlled using MARKER Position (3). Movable through extent of visible screen.

11. Trigger Level Indicator

Indicates approximate level of Oscilloscope Trigger Level. Editable using TRIGGER (5).

12. Oscilloscope Scale

Displays selected Oscilloscope Vertical Scale. Scales available include:

10 mV	20 mV	50 mV
100 mV	200 mV	500 mV
1 V	2 V	5 V
10 V	20 V	50 V

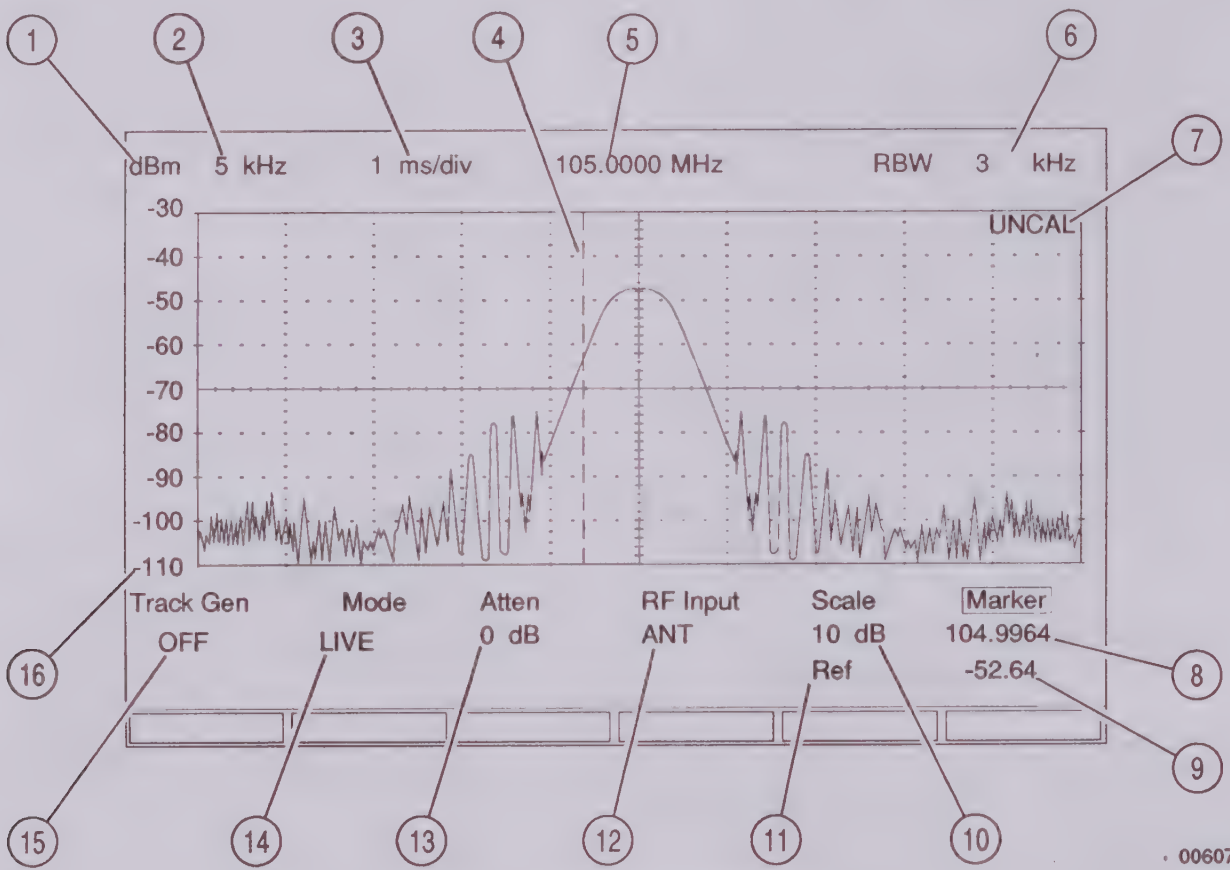
Soft Function Keys available with this function include:

F1 MENU
Accesses Menu to set Oscilloscope Scale. Soft Function Keys available with this function include:

F6 RETURN
Exits Menu into normal operation.

3-3-5 SPECTRUM ANALYZER OPERATION SCREEN

The Independent Spectrum Analyzer Operation Screen operates independent of the Test Modes. The Spectrum Analyzer Operation Screen is accessed by pressing the ANLYZ Instruments Key. When accessed, the Spectrum Analyzer Operation Screen is set up in the configuration last used.



Spectrum Analyzer Operation Screen

1. Logarithmic Function

Displays Logarithmic Function for referencing Vertical Scale (14). Selections include dBm, dBµV, dBmV, dBV, dBµW and dBW.

Soft Function Keys available with this function include:

F1 dBm
Selects dBm as Logarithmic Function.

F2 dBµV
Selects dBµV as Logarithmic Function.

Soft Function Keys available with this function include:

F1 On/Off
Toggles Marker (3) between ON and OFF.

9. Marker Level

Displays current Marker Level if Marker (4) is active. Displays Blank if Marker (4) is OFF.

10. Scale

Displays Logarithmic Scale for Vertical Scale (16). Selections are 2 and 10 dB.

F1 10 dB
Selects 10 dB Logarithmic Scale for Spectrum Analyzer Vertical Scale (14).

F2 2 dB
Selects 2 dB Logarithmic Scale for Spectrum Analyzer Vertical Scale (14).

11. Reference

Adjusts Spectrum Analyzer Vertical Scale (16) ±10 dB when Scale (10) is set to 10 dB. When Scale (10) is set to 2 dB, adjusts Spectrum Analyzer Vertical Scale (16) through full range, displaying 16 dB window and incrementing in 1 dB steps.

12. RF Input

Displays RF Input. Selections are ANT (ANTENNA Connector) and T/R (T/R Connector).

Soft Function Keys available with this function include:

F1 T/R
Selects T/R Connector as RF Input Connector.

F2 ANT
Selects ANTENNA Connector as RF Input Connector.

13. Attenuation

Displays selected Attenuation for RF Input (12). Selections include 0 and 30 dB.

Soft Function Keys available with this function include:

F1 30 dB
Selects 30 dB Attenuation for RF Input (12).

F2 0 dB
Selects 0 dB Attenuation for RF Input (12).

14. Mode

Displays selected Operation Mode. Selections include Menu, Average, Peak Hold, Minimum Hold and Store. Menu displays a menu window with selections Live, Recall, Compare, Live-Ref and Ref-Live. Live displays current signal without modification. Recall displays Stored trace only. Compare displays Stored trace and live trace simultaneously. In Live-Ref, the value of each point of the reference trace is subtracted from the current reading and the result is displayed. In Ref-Live, the value of current reading is subtracted from the stored value and the result is displayed. Both Live-Ref and Ref-Live require a previously stored trace. Average displays average of last four traces. Pk Hold displays and holds the trace peak. Min Hold displays and holds minimum trace.

Store places copy of current trace in memory.

Soft Function Keys available with this function include:

F1 MENU
Accesses a Menu with Mode selections.

F1 LIVE
Selects LIVE as Spectrum Analyzer Operation Mode.

F2 RECALL
Selects RECALL as Spectrum Analyzer Operation Mode.

F3 COMPARE
Selects COMPARE as Analyzer Spectrum Operation Mode.

F4 LIVE-REF
Selects LIVE-REF as Spectrum Analyzer Operation Mode.

F5 REF-LIVE
Selects REF-LIVE as Spectrum Analyzer Operation Mode.

F6 RETURN
Exits Menu into Generate Operation Screen.

F2 AVG
Activates/deactivates Average Spectrum Analyzer Operation Mode.

F3 PK HOLD
Activates/deactivates Peak Hold Spectrum Analyzer Operation Mode.

F4 MIN HOLD
Activates/deactivates Minimum Hold Spectrum Analyzer Operation Mode.

F6 STORE
Stores the current trace.

15. Tracking Generator (Option 12)

Displays Tracking Generator Signal level available at AUX RF OUT Connector when active and OFF when inactive. Displayed only with Option 12 installed.

Soft Function Keys available with this function include:

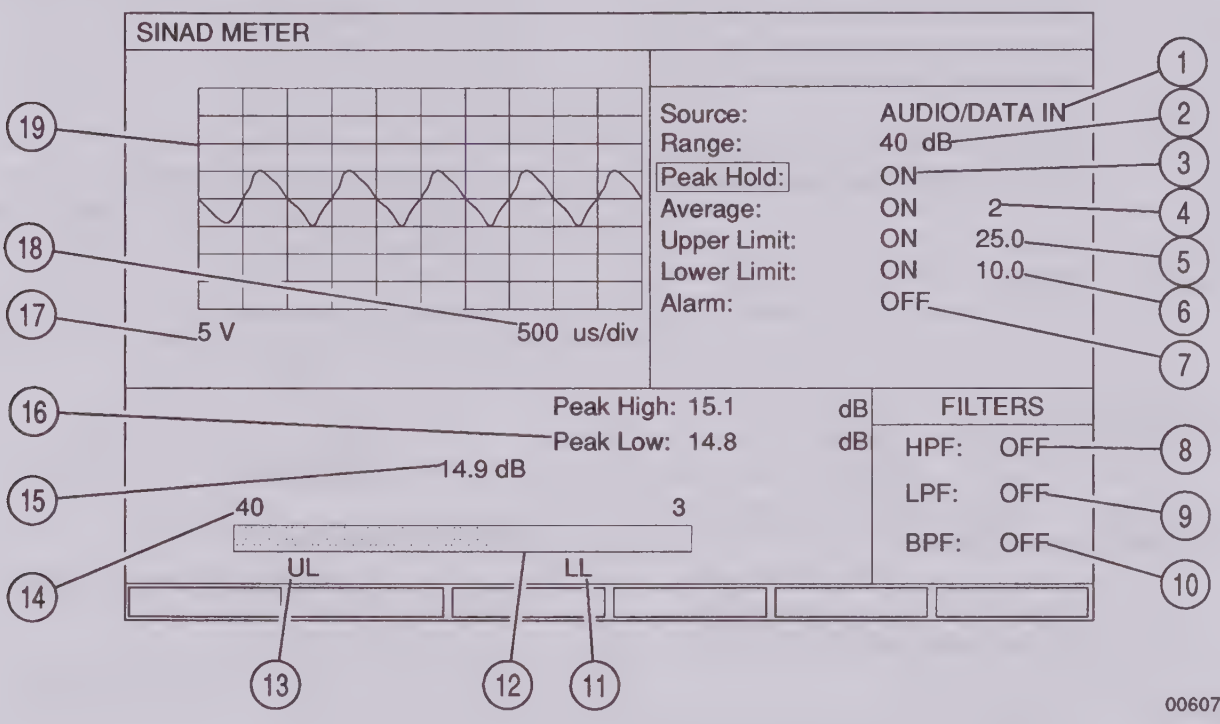
F1 On/Off
Sets Tracking Generator (Option 12) ON or OFF.

16. Vertical Scale

Provides logarithmic scale for trace. Position is controlled by Reference (11).

B. SINAD METER

The SINAD Meter determines SINAD for a 1 kHz tone passed to the COM-120B through the specified Source. Information provided the user is displayed below:



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1. Source

Displays selected source for SINAD Meter. Selections include AUDIO/DATA IN Connector and Scope/DVM Connector.

Soft Function Keys available with this function include:

F1 AUD/DAT
Selects AUDIO/DATA IN Connector as Source for SINAD Meter.

F2 SCP/DVM
Selects Scope/DVM Connector as Source for SINAD Meter.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

2. Range

Displays selected SINAD Meter Upper Range. Selections include Autorange, 15 dB and 40 dB.

Soft Function Keys available with this function include:

F1 15 dB
Selects 15 dB as active upper range for SINAD Meter.

F2 40 dB
Selects 40 dB as active upper range for SINAD Meter.

F3 AUTO
Selects Autorange as active upper range for SINAD Meter. This setting will automatically adjust to a higher or lower upper range if signal increases or decreases to a specified level of the current setting.

F5 RST PK
Resets Peak Readings displayed to 0.

F6 RETURN
Returns Test Set to Meters Menu.

3. Peak Hold

Displays current status of Peak Hold function. Displays OFF or ON. Not valid in Autorange.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

4. Average

Displays current status of Averaging Function and number of samples when active. Status is Off or On. Range of samples is 2 to 10.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

5. Upper Limit

Displays current status of Upper Limit Function and Upper Limit value when active. Status is OFF or ON. Range of value is 0 to 40 dB.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

6. Lower Limit

Displays current status of Lower Limit Function and Lower Limit value when active. Status is OFF or ON. Range of value is 0 to 40 dB.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Average Function On and Off.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Test Set to Meters Menu.

4-2 RF GENERATE OPERATION

Pressing the GEN MODE Key accesses the RF Generate Operation Screen. The purpose of the RF Generate Mode is for the COM-120B to act as a transmitter and test a receiver. This section provides information in configuring the COM-120B to perform tests on the receiver.

This section is provided to explain how each of the active fields are edited and what selections are available. It is not designed to perform a specific test, but instead is provided as a reference for operating the RF Generate Operation Screen. Below is a list of Operations available with the RF Generate Operation Screen:

4-2-1 RF Generate General Operation

4-2-2 Generating FM Modulated RF Signal

4-2-3 Generating AM Modulated RF Signal

4-2-4 Generating PM Modulated RF Signal

4-2-5 Generating DCS Coded RF Signal

4-2-6 Generating DTMF Coded RF Signal

4-2-7 Generating RF Signal Using External Modulation

4-2-8 Generating Microphone Modulated RF Signal

4-2-9 Measuring Receiver Center Frequency

4-2-10 Measuring Receiver Sensitivity

4-2-11 Measuring Receiver Selectivity

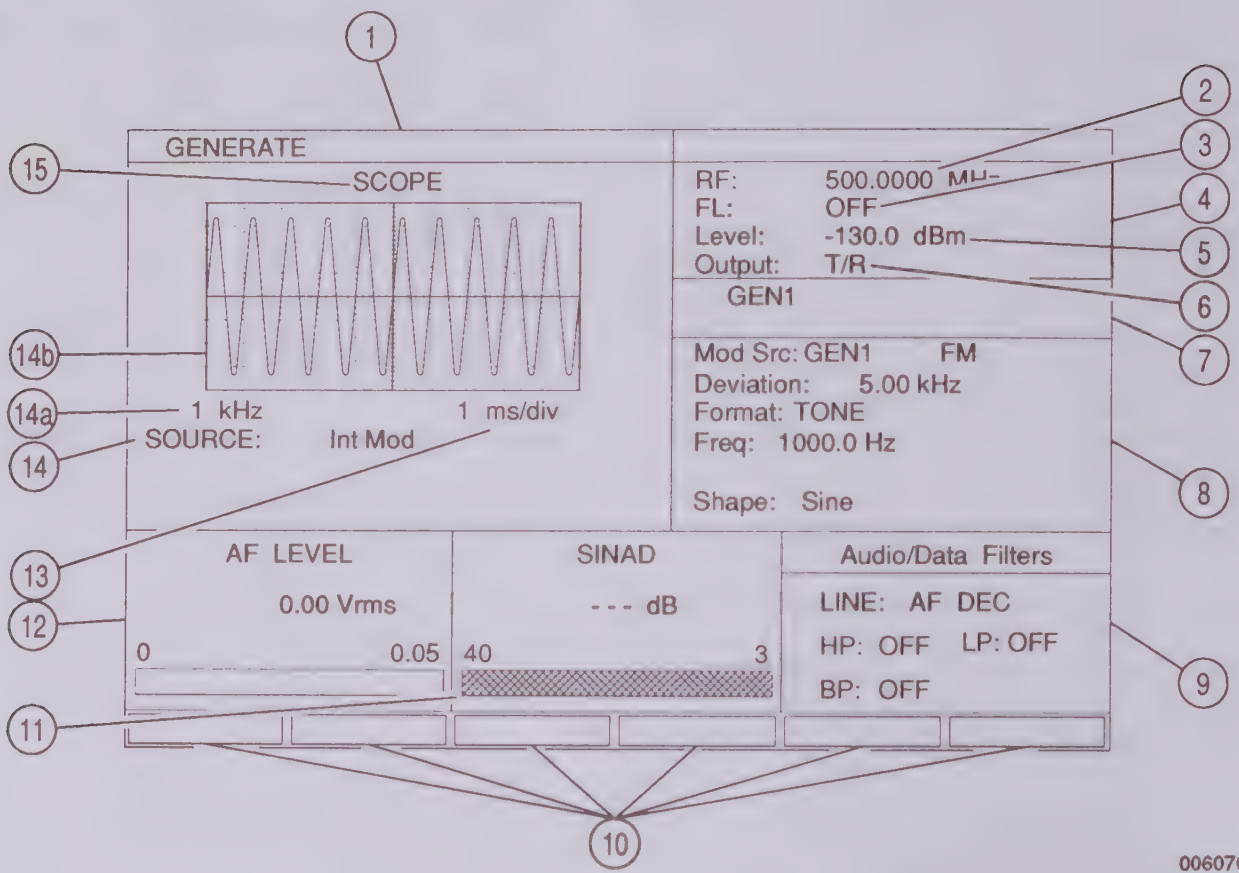
4-2-12 Measuring Receiver Audio Output Level

4-2-13 Measuring Modulation Acceptance Bandwidth

4-2-14 Measuring Receiver IF Bandwidth

4-2-1 RF GENERATOR GENERAL OPERATION

A. RF GENERATE GENERAL OPERATION SCREEN



RF Generator Operation Screen

1. Enter desired frequency in RF Field (2). Frequency range is .0000 to 1000 MHz. Activate additional functions as required as follows:

   - To operate with Δ Function active:

     - Press Δ On/Off Soft Function Key F2 until Δ prompt appears beside RF Field (2).

     - Δ= increment is accessed by pressing Δ= Soft Function Key F1, activating window to set RF Field (2) change increment. Range is 0 to 500 MHz. Press RETURN Soft Function Key F6 to close Change Window.

     - To deactivate Δ Function, press Δ On/Off Soft Function Key F2 until Δ prompt no longer appears beside RF Field (2).

   - To Operate with Set Reference Function, press SET REF Soft Function Key F3 until ***R*** appears beside RF Field (2). When active, RF Field (2) is set to 0 MHz and changes made to RF Field (2) display offset from Reference

Frequency. To deactivate Set Reference Function, press SET REF Soft Function Key until ***R*** is not visible.

- To Operate with Sweep Operation, press SWEEP Soft Function Key F4 to open Sweep Configuration Window. Once Sweep Configuration Window is opened:
  - Move Cursor to Start Field. Enter Start Frequency for Sweep Operation.
  - Move Cursor to Stop Field. Enter Stop Frequency for Sweep Operation.
  - Move Cursor to Increment Field. Enter Increment for Sweep Operation.
  - Move Cursor to Pause Time Field. Enter time to pause at each frequency.
  - If single sweep is desired, press SINGLE Soft Function Key F3. If continuous sweep is desired, press START Soft Function Key F1. To stop Sweep Function, press STOP Soft Function Key F2. To resume Sweep Operation once stopped, press RESUME Soft Function Key F5.
  - Press RETURN Soft Function Key F6 to exit Sweep Function.

Set Reference Function and Sweep Function cannot be active simultaneously.

- To Operate with RF Generate, RF Receive and Spectrum Analyzer RF Frequencies locked, press LOCK/UNLOCK Soft Function Key F5 until ***L*** is displayed beside RF Field and UNLOCK is displayed for F5 definition. Press UNLOCK Soft Function Key F5 to set LOCK Function to OFF.

2. If Frequency List Operation is desired instead of entering frequency in RF Field (2), select Frequency List (3) Setting as follows:
   - Select desired Frequency List (3) Type as follows:
     - Press T-Fwd Soft Function Key F2 to select Trunking Forward Channel List.
     - Press T-Rvs Soft Function Key F3 to select Trunking Reverse Channel List.
     - Press C-Fwd Soft Function Key F4 to select Cellular Forward Channel List.
     - Press C-Rvs Soft Function Key F5 to select Cellular Reverse Channel List.
     - Press FL Soft Function Key F6 to select User Defined Frequency List.
   - Press ON/OFF Soft Function Key F1 to active Frequency List (3) Setting.
   - If Cellular Channel List or User Defined Frequency List is selected, enter channel/frequency number. Range of cellular channels is 1 to 1023. Range of Frequency List is 0 to 99.
   - If Trunking Channel List is selected, select channel number. Select Frequency Band by moving cursor to Frequency Band Field and pressing ENTER. Select desired Frequency Band using DATA

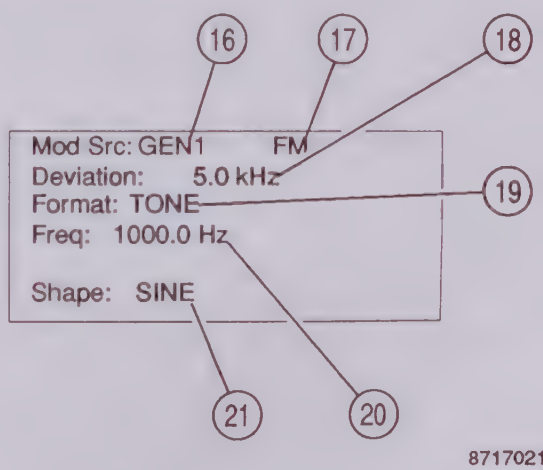
SCROLL Keys or DATA SCROLL Spinner. Press ENTER Key.

3. Set Output Level (5) as follows:

   - Select Output Level Units as follows:
     - Press dBm Soft Function Key F1 to select dBm as Output Level Units.
     - Press uV Soft Function Key F2 to select µV as Output Level Units.
     - Press mV Soft Function Key F3 to select mV as Output Level Units.
     - Press V Soft Function Key F4 to select V as Output Level Units.
   - Once Output Level Units are selected, select Output Level.
   - To operate with SINAD Search Function:
     - Press SINAD= Soft Function Key F5 to access field to set SINAD Search Function value. Range of SINAD = is 6 to 30 dB.
     - Press RETURN Soft Function Key F6.
     - Press S=On/Off Soft Function Key F6 until *S=* is displayed beside Output Level Field to activate SINAD Search Function.
     - Press S=On/Off Soft Function Key F6 until *S=* disappears to deactivate SINAD Search Function.

4. Select Output (6) as follows:

   - Press T/R Soft Function Key F1 to select T/R Connector as output connector.
   - Press AUX Soft Function Key F2 to select AUX RF Connector as output connector.
   - Press T/R Gate Soft Function Key F3 to select T/R Connector as output connector.
   - Press AUX Gate Soft Function Key F4 to select AUX RF Connector as gated output connector.

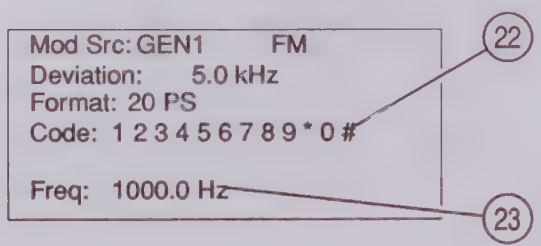


5. Modulation Source Window (7) displays all active Function Generators. To activate or deactivate Function Generators, each Function Generator must be edited separately. If two (or more) sections of the RF Modulator are set in conflict (e.g. GEN1 set for PM and GEN2 set for FM, or GEN1 set for 0.001 kHz deviation and GEN2 set for 2.60 kHz deviation) the screen displays the invalid source grayed out. Set Modulation Source Block (8) as follows:

- If Audio Generator 1 (GEN1) Operation is desired, perform Step 6.
- If Audio Generator 2 (GEN2) Operation is desired, perform Step 7.
- If DATA Generator (DATA) Operation is desired, perform Step 8.
- If DTMF Generator (DTMF) Operation is desired, perform Step 9.
- If External Modulation (EXT) Operation is desired, perform Step 10.
- If Microphone Modulation (MIC) Operation is desired, perform Step 11.

6. If Audio Generator 1 (GEN1) Operation is desired, set Modulation Source Block (8) as follows:
   - Press GEN1 Soft Function Key F1 to select GEN1 for Modulation Source (16).
   - Select Modulation Type (17) as follows:
     - Press OFF Soft Function Key F1 to deactivate GEN1.
     - Press AM Soft Function Key F2 if AM Modulation is desired.
     - Press FM Soft Function Key F3 if FM Modulation is desired.
     - Press PM Soft Function Key F4 if PM Modulation is desired.
   - Enter Deviation/Modulation Level (18). Range is 0.00 to 100 kHz for FM Modulation, 0.0% to 100.0% for AM Modulation and 0.00 to 10 Radians for PM Modulation.
   - Select Format (19). Formats available include TONE and USER.
   - With cursor on Format (19), select transmission type:
     - Press CONT Soft Function Key F2 to select continuous transmission of signal.
     - Press BURST Soft Function Key F3 if single transmission of selected signal.
     - If TONE is selected as Format (19), press TIME Soft Function Key F4 to access Burst TIme WIndow. Enter Burst Time. Press RETURN Soft Function Key F6 to exit Window.
     - IF USER is selected as Format (19), press CONFIG Soft Function Key F4 to access Configuration Window for configuring User Selectable Frequency and Duration for codes 0 through 9 and A through T. Enter desired frequencies and durations for codes. Range of frequencies are 0 to 9999.9 Hz. Range of durations are 0 to 99.999 seconds. Use PG UP Soft Function Key F1 to scroll up through Configuration Window. Use PG DN to scroll down through Configuration Window. Use FILL Soft Function Key F3 to fill remainder of current column with value of current cursor position. Press RETURN Soft Function Key F6 to exit Window.

- If TONE is selected as Format (19):
  - Enter Audio Tone Frequency (20). Range is 5 Hz to 20000 Hz with Shape (21) set to SINE. Range is 5 Hz to 10000 Hz otherwise.
  - Select Shape (21) of Wave as follows:
    - Press SINE Soft Function Key F1 to select SINE Wave Shape.
    - Press RAMP Soft Function Key F2 to select RAMP Wave Shape.
    - Press TRIANGLE Soft Function Key F3 to select TRIANGLE Wave Shape.
    - Press SQUARE Soft Function Key F4 to select SQUARE Wave Shape.



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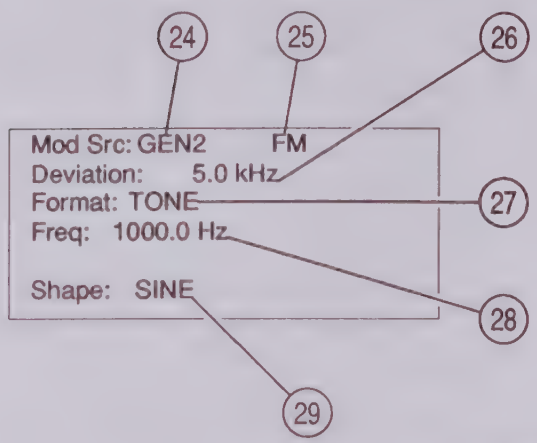
- If TONE is not selected Format (19):
  - Enter Code (22). Pressing CLEAR Soft Function Key F1 clears current code entry.



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7. If Audio Generator 2 (GEN2) Operation is desired, set Modulation Source Block (8) as follows:
   - Press GEN2 Soft Function Key F2 to select GEN2 for Modulation Source (24).
   - Select Modulation Type (25) as follows:
     - Press OFF Soft Function Key F1 to deactivate GEN2.
     - Press AM Soft Function Key F2 if AM Modulation is desired.
     - Press FM Soft Function Key F3 if FM Modulation is desired.
     - Press PM Soft Function Key F4 if PM Modulation is desired.
   - Enter Deviation/Modulation Level (26). Range is 0.00 to 100 kHz for FM Modulation, 0.0% to 100.0% for AM Modulation and 0.00 to 10 Radians for PM Modulation.

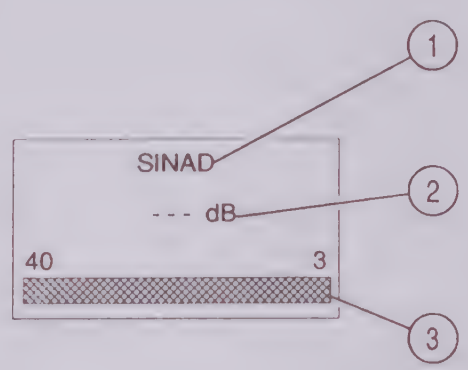
- Select DTMF/SINAD Low-Pass Filter Field (54) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press 4 kHz Soft Function Key F3 to activate 4 kHz Low-Pass Filter.
  - Press 20 kHz Soft Function Key F4 to activate 20 kHz Low-Pass Filter.
- Press EXEC Soft Function Key F5 to Execute all edits made to the screen.
- Select Speaker/Headphones Filter Field (56) setting as follows:
  - Press OFF Soft Function Key F1 to set Filter to OFF.
  - Press C-MSG Soft Function Key F2 to select C-Message Weighted Filter.
  - Press W.B. Soft Function Key F3 to select no filtering.
  - Press INT-MOD Soft Function Key F4 to route from Internal Modulation Sources to Speaker.
- Move Cursor off Speaker/Headphones Filter Field (56) and press RETURN Soft Function Key F6 to return to RF Generate Operation Screen.
- To display different Filter Line (48) settings:
  - Press AF DEC Soft Function Key F1 to display DTMF/SINAD Filter Settings.
  - Press SPKR Soft Function Key F2 to display Speaker/ Headphones Filter Settings.

13. Select desired Meter Operation as follows:
    - Press SINAD Soft Function Key F2 to select SINAD Meter as active meter. Not displayed if meter is currently active.
    - Press DIST Soft Function Key F3 to select Distortion Meter as active meter. Not displayed if meter is currently active.
14. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

B. SINAD METER

The SINAD Meter for the RF Generate Operation Screen measures SINAD for an audio signal passed through the AUDIO/DATA IN Connector. Filtering for the signal passed to the SINAD Meter is provided by the Audio/Data Filters.

Configure and operate the SINAD Meter as follows:



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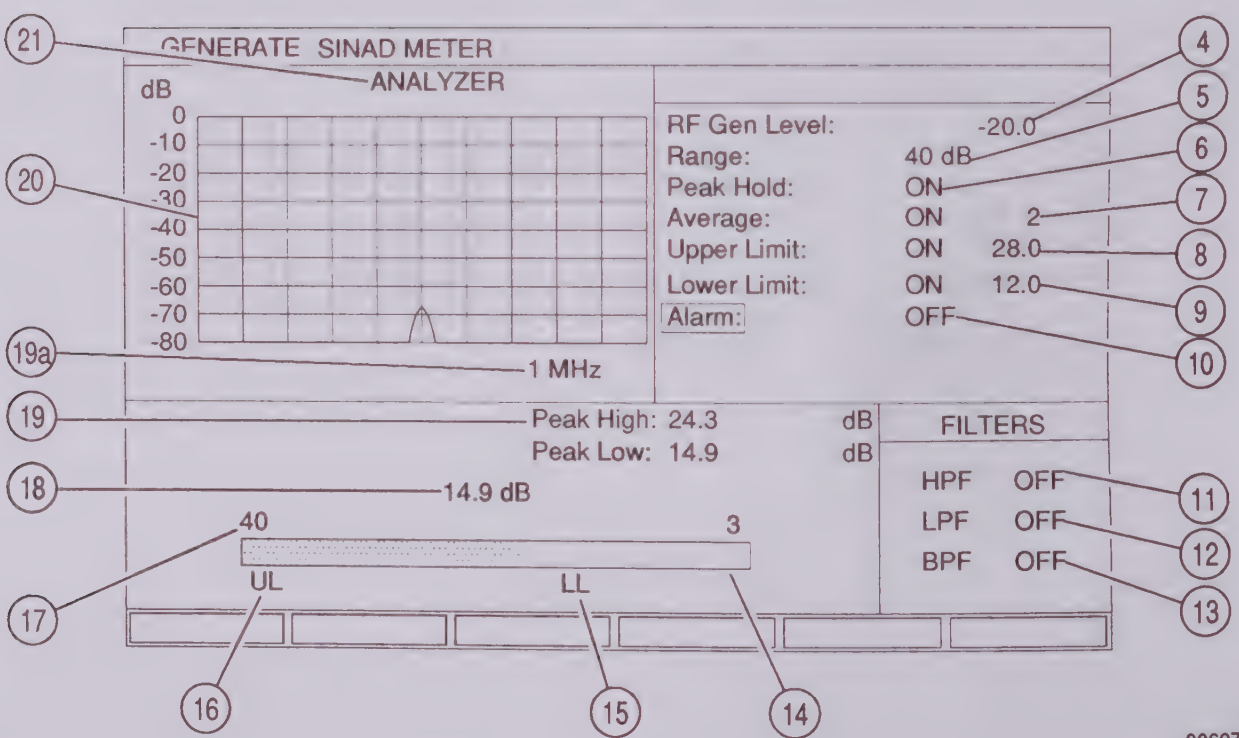

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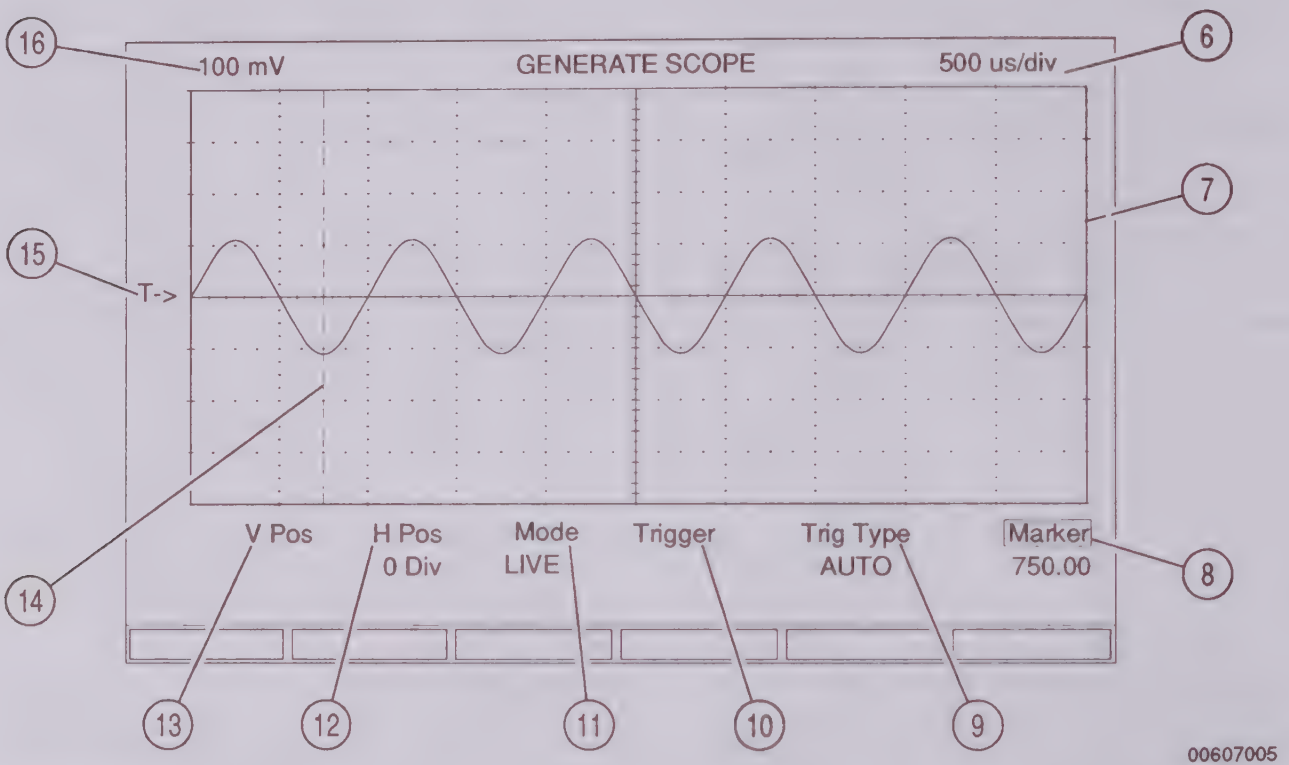
Source	Signal Input	Signal Type
Scope/DVM-GND	SCOPE/DVM Connector	External Ground-Coupled Signal
Scope/DVM-AC	SCOPE/DVM Connector	External AC-Coupled Signal
Scope/DVM-DC	SCOPE/DVM Connector	External DC-Coupled Signal
Ext Mod	EXT MOD IN Connector	External Modulation
Notch Residual	Internal Filtered Signal	Notch Filtered Signal passed to SINAD and Distortion Meters. Reading is relative with no units applied.
Audio/Data In	AUDIO/DATA IN Connector	External Audio or Data Signal
Int Mod	Internal Modulation	Composite Modulation Signal generated by Internal Audio/Data Generators

3. Select Oscilloscope Scale (5). Selections include:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
Ext Mod	100, 200, 500 mV/Div 1, 2, 5 V/Div
Notch Residual	0.002, 0.004, 0.10, 0.20, 0.40, 1.00
Audio/Data In	100, 200, 500 mV/Div 1, 2, 5 V/Div
Int Mod	
GEN1 FM >25 kHz:	1, 2, 5, 10, 20, 50 kHz/Div
GEN1 FM 2.5 to 12.75 kHz:	1, 2, 5, 10, 20, 50 kHz/Div
GEN1 FM 12.75 to 25 kHz:	.2, .4, 1, 2, 4, 10 kHz/Div
GEN1 FM <2.5 kHz:	.2, .4, 1, 2, 4, 10 kHz/Div
GEN1 PM <2.55 RAD:	.2, .4, 1, 4, 10 RAD/Div
GEN1 PM >2.55 RAD:	1, 2, 5, 10, 20,50 RAD/Div
GEN1 AM:	all settings 20%

Pressing ZOOM Soft Function Key F1 accesses full screen Oscilloscope, when cursor is on SCOPE/ANALYZER Prompt (1) of RF Generate Operation Screen and abbreviated Oscilloscope is displayed. SCOPE SOURCE (4) must be selected before Full Screen Oscilloscope is accessed. Configure the full screen Oscilloscope as follows:



1. Select Sweep (6). Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

Press ROLL Soft Function Key F2 to view the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher. Press SLOW Soft Function Key F2 to return to the normal mode of operation.

2. Select Trigger Type (9) as follows:

- Press NORM Soft Function Key F1 to select Normalized Trigger.
- Press AUTO Soft Function Key F2 to select Auto Trigger.
- Press 1 SHOT Soft Function Key F3 to select One Shot Trigger. Press 1 SHOT Soft Function Key F3 as needed to reset Trigger.

3. Set Trigger Level (15) as follows:

- Move cursor to Trigger (10).
- Use DATA SCROLL Spinner or DATA SCROLL Keys to set Trigger.

4. Select Operation Mode (11) as follows:

- Press MENU Soft Function Key F1 to access Operation Mode menu selections.

- Press LIVE Soft Function Key F1 to select Live Operation Mode.
- Press RECALL Soft Function Key F2 to select Recall Operation Mode.
- Press COMPARE Soft Function Key F3 to select Compare Operation Mode.
- Press LIVE-REF Soft Function Key F4 to select Live-Ref Operation Mode.
- Press REF-LIVE Soft Function Key F5 to select Ref-Live Operation Mode.
- Press RETURN Soft Function Key F6 to exit to Generate Scope.

- Press AVG Soft Function Key F2 to select Average Operation Mode.
- Press PK HOLD Soft Function Key F3 to select Peak Hold Operation Mode.
- Press MIN HOLD Soft Function Key F4 to select Minimum Hold Operation Mode.
- Press STORE Soft Function Key F6 to store the current trace.

5. Select H Pos (12) Offset as needed. Range is -10 to 10 Divisions.

6. Set Vertical Position of trace as needed by accessing V Pos (13) and editing with DATA SCROLL Keys or DATA SCROLL Spinner.

7. Select Oscilloscope Scale (16). Selections available are dependent on Scope Source (4). Selections include:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
Ext Mod	100, 200, 500 mV/Div 1, 2, 5 V/Div
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data In	100, 200, 500 mV/Div 1, 2, 5 V/Div
Int Mod GEN1 FM >25 kHz:	1, 2, 5, 10, 20, 50 kHz/Div
GEN1 FM 2.5 to 12.75 kHz:	1, 2, 5, 10, 20, 50 kHz/Div
GEN1 FM 12.75 to 25 kHz:	.2, .4, 1, 2, 4, 10 kHz/Div
GEN1 FM <2.5 kHz:	.2, .4, 1, 2, 4, 10 kHz/Div
GEN1 PM <2.55 RAD:	.2, .4, 1, 4, 10 kHz/Div
GEN1	1, 2, 5, 10, 20,50 RAD/Div
GEN1 AM:	all settings 20%

8. Activate Marker (14), as required, as follows:
   - With Cursor on Marker Position (8), press On/Off Soft Function Key F1.
   - Enter Desired Marker Position using DATA ENTRY Keys or DATA SCROLL Keys and/or DATA SCROLL Spinner.

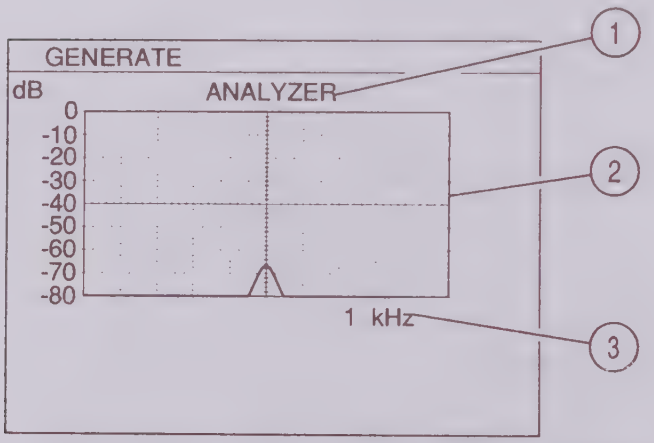
F. SPECTRUM ANALYZER OPERATION SCREEN

The RF Generator Spectrum Analyzer is usable as an abbreviated Spectrum Analyzer or as a Full Screen Spectrum Analyzer. Configuring one is reflected in the other.

The abbreviated Spectrum Analyzer, as shown below, is visible from the RF Generate Operation Screen and the following Meters:

SINAD Meter Operation Screen
Distortion Meter Operation Screen
Audio Frequency Level Meter Operation Screen

Parameters set on any of the above Operation Screens are reflected in all. Configuring the abbreviated Spectrum Analyzer is as follows:



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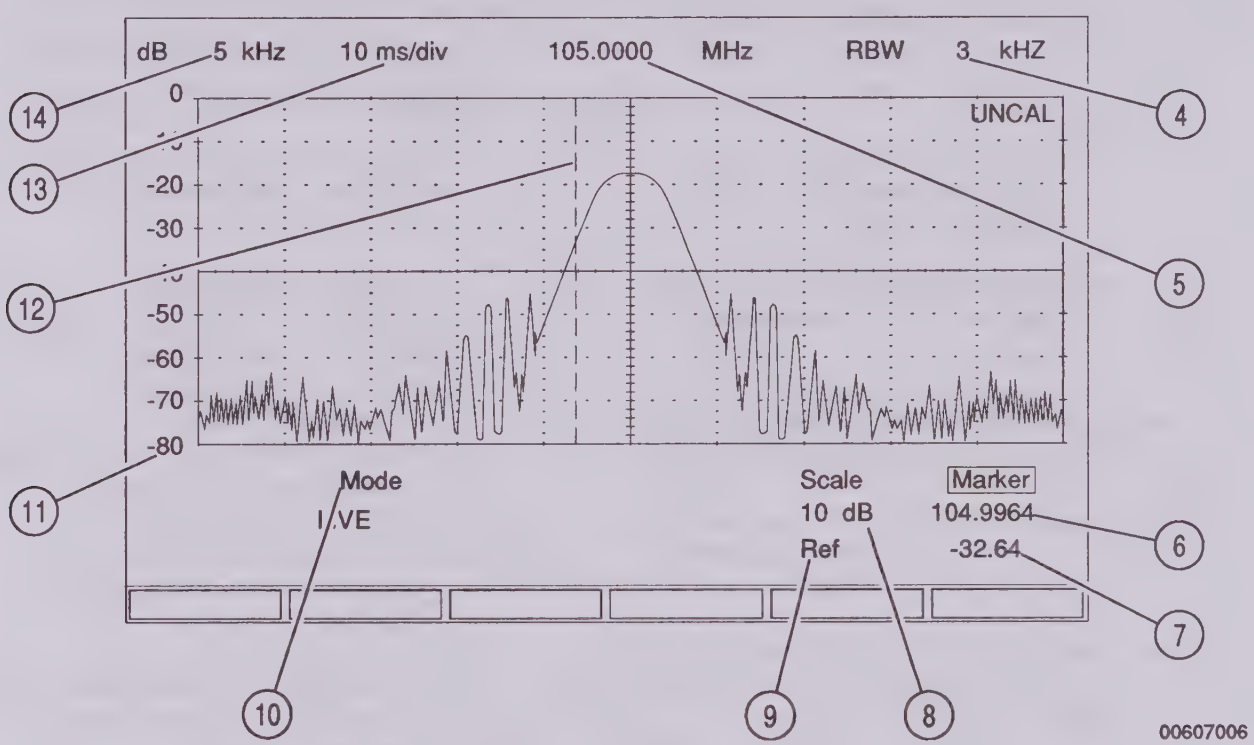
1. Select Scan Width (3). Selections include zero scan and:

1 kHz	2 kHz	5 kHz
10 kHz	20 kHz	50 kHz
100 kHz	200 kHz	500 kHz
1 MHz		

- Press MENU Soft Function Key F1 for menu selections.
- Press CONFIG Soft Function Key F2 to access a pop up screen to configure Scan Width, Resolution Bandwidth (RBW) and Sweep rate.

Pressing ZOOM Soft Function Key F1 accesses full screen Spectrum Analyzer, when cursor is on SCOPE/ANALYZER Prompt (1) of RF Generate Operation Screen and abbreviated Spectrum Analyzer is displayed. Available features and parameters are described below:



1. Set Center Frequency (5). Press Set Ref Soft Function Key F1 to set current Center Frequency as Reference Frequency.

2. Select Scan Width (14). Selections include zero scan and:

1 kHz	2 kHz	5 kHz
10 kHz	20 kHz	50 kHz
100 kHz	200 kHz	500 kHz
1 MHz	2 MHz	5 MHz
10 MHz	20 MHz	50 MHz
100 MHz		

   The word "UNCAL" appears in the display when combinations of RBW, frequency span and sweep rate for which the analyzer is not calibrated are used.

3. Set Scale (8) as follows:

   - Press 10 dB Soft Function Key F1 to select 10 dB for Vertical Scale (11).
   - Press 2 dB Soft Function Key F2 to select 2 dB for Vertical Scale (11).

4. Select Mode (10) as follows:

   - Press MENU Soft Function Key F1 to access Operation Mode menu selections.
     - Press LIVE Soft Function Key F1 to select Live Operation Mode.
     - Press RECALL Soft Function Key F2 to select Recall Operation Mode.

- Press COMPARE Soft Function Key F3 to select Compare Operation Mode.
- Press LIVE-REF Soft Function Key F4 to select Live-Ref Operation Mode.
- Press REF-LIVE Soft Function Key F5 to select Ref-Live Operation Mode.
- Press RETURN Soft Function Key F6 to exit to Generate Analyzer.

- Press AVG Soft Function Key F2 to select Average Operation Mode.
- Press PK HOLD Soft Function Key F3 to select Peak Hold Operation Mode.
- Press MIN HOLD Soft Function Key F4 to select Minimum Hold Operation Mode.
- Press STORE Soft Function Key F6 to store the current trace.

5. Activate Marker (12), as required, as follows:

   - With Cursor on Marker Position (6), press On/Off Soft Function Key F1.
   - Enter Desired Marker Position using DATA ENTRY Keys or DATA SCROLL Keys and/or DATA SCROLL Spinner.

6. Access Ref (9) Field to adjust Vertical Scale (11), as needed.

7. If Scan Width (14) is set to zero scan, enter Zero Scan Sweep (13). Selections Include:

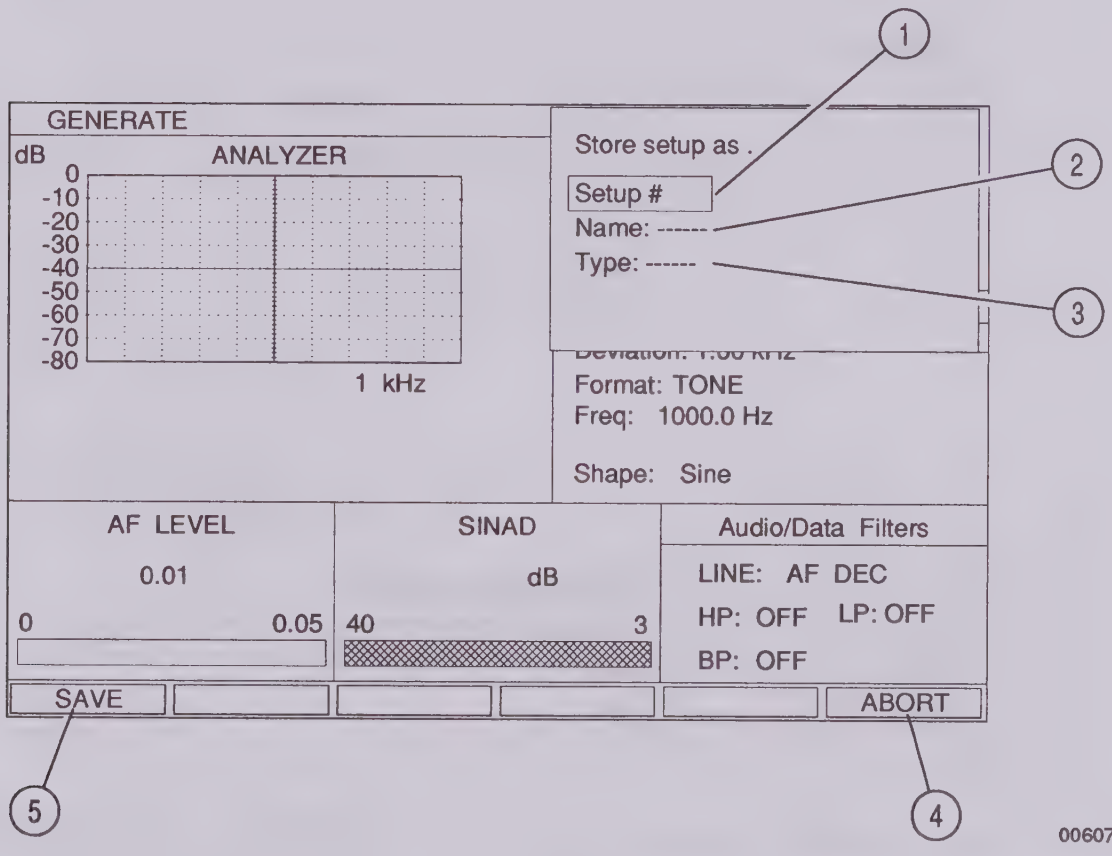
200 µs/div	500 µs/div	1 ms/div
2 ms/div	5 ms/div	10 ms/div
20 ms/div	50 ms/div	100 ms/div
200 ms/div	500 ms/div	

   - Press MENU Soft Function Key F1 to set Zero Scan Sweep.
   - Press Press RETURN Soft Function Key F6 to exit into normal operation.
   - Press DEFLT Soft Function Key F5 to set the current field to factory default.
   - Press COUPLE Soft Function Key F6 to set the sweep and RBW to factory default state for the current scan width.

G. STORE AND RECALL OPERATION

Pressing STORE Memory Key allows the operator to store up to 50 RF Generate Operation Screen configurations. Storage Locations 0 through 49 can be used to store a RF Generate Operation configuration, a RF Receive Operation configuration or a Duplex Operation configuration (Receive and Generate pair).

STORE Operation for RF Generate Operation is as follows:



1. Press STORE MEMORY Key.

2. Enter or scroll through Setup # (1) value. Range is 0 to 49. Press ENTER Key.

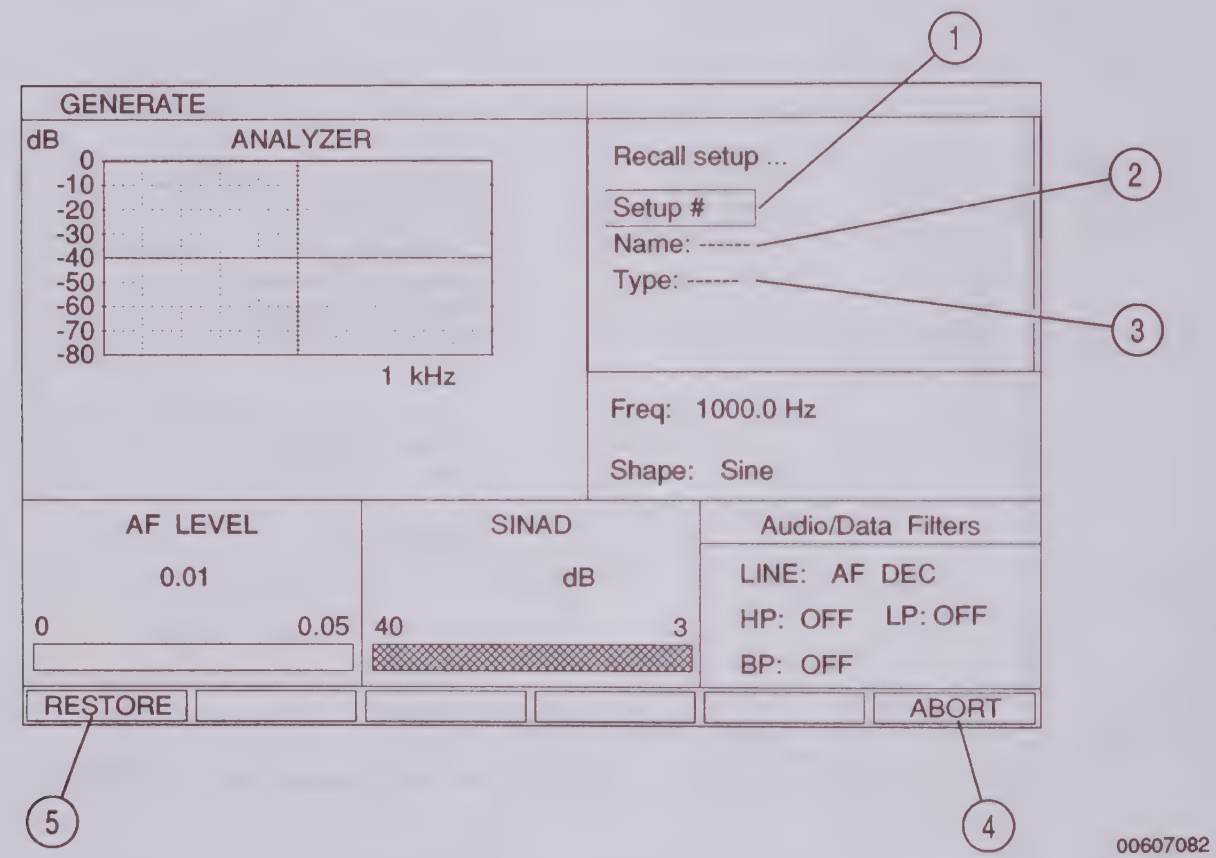
3. If Name (2) is desired, press ENTER Key, with Cursor on Name (2). Enter Name using DATA ENTRY Keys. Name can be alphabetic and/or numeric characters. Press ENTER Key.

4. Type (3) displays the type of data currently saved in the specified setup number. Types saved are: DUPLEX, GENERATOR, RECEIVER, GENERATOR & RECEIVER and EMPTY.

5. Press SAVE Soft Function Key F1 (5) to accept selections and save Setup. Press ABORT Soft Function Key F6 (4) to escape without saving Setup.

Pressing RCL Memory Key allows the operator to recall up to 50 previously stored setups. RF Receive, RF Generate or Duplex Operation Screen configurations and all be accessed from the RF Generate Operation Screen. Accessing anything other than an RF Generate Operation Screen configuration, automatically switches the COM-120B to the selected mode of operation.

RECALL Operation for RF Generate Operation is as follows:



1. Press RECALL MEMORY Key.

2. Enter Setup # (1) value. Range is 0 to 49. Press ENTER Key.

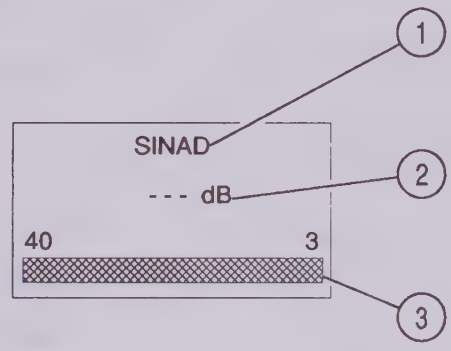
3. Type (3) displays the type of data currently saved in the specified setup number. Types recalled are: DUPLEX, GENERATOR, RECEIVER, GENERATOR & RECEIVER and EMPTY.

4. Press RESTORE Soft Function Key F1 (5) to accept selections and recall Setup. Press ABORT Soft Function Key F6 (4) to escape without recalling Setup.

B. SINAD METER

The SINAD Meter for the RF Receiver measures SINAD for a 1 kHz tone demodulated from an RF Signal. Filtering, for the signal passed to the SINAD Meter, is provided by the Audio/Data Filters.

Configure and operate the SINAD Meter as follows:



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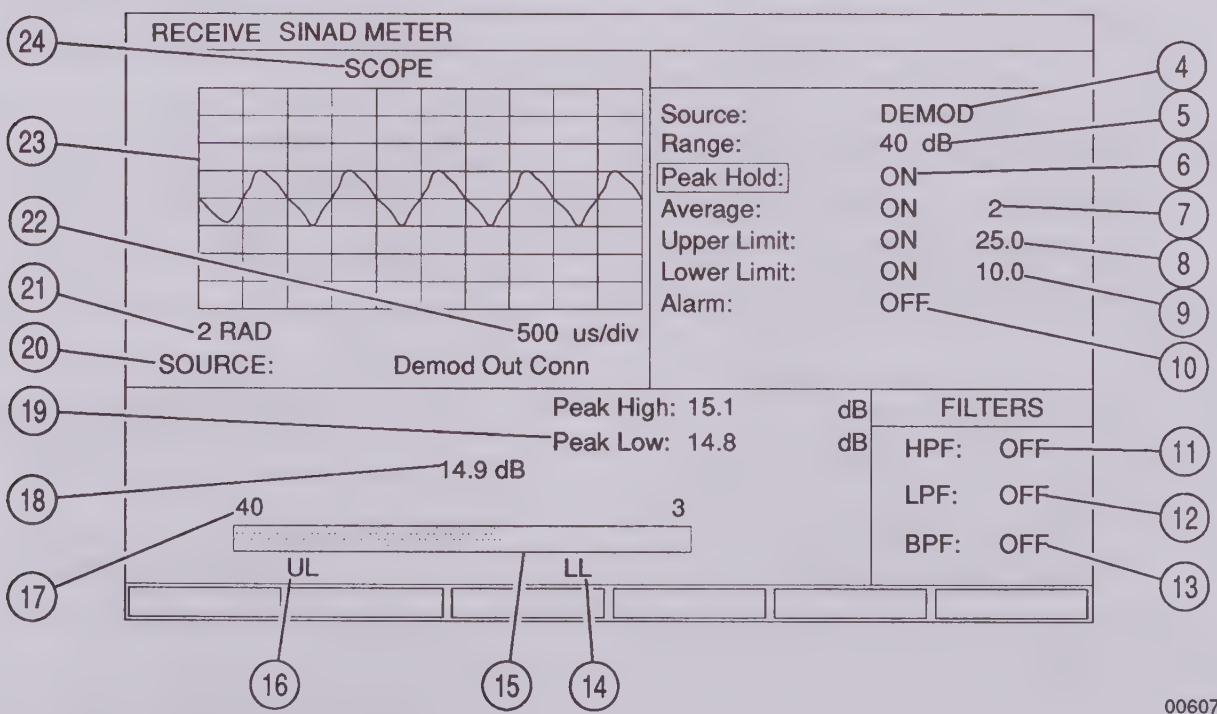

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1. With cursor on SINAD/Distortion/ Modulation Meter Label (1), press ZOOM Soft Key F1. Full Screen SINAD Meter is displayed.

2. Select Range (5) as follows:

   - Press 15 dB Soft Function Key F1 to select 15 dB Range (5).
   - Press 30 dB Soft Function Key F2 to select 30 dB Range (5).
   - Press AUTO Soft Function Key F3 to select Autorange for Range (5).

3. If Peak Hold Function is desired, do not select Autorange. Configure as follows:

   - With cursor on Peak Hold (6), press OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***OFF***.

4. If Average Function is desired, configure as follows:

   - With cursor on Average (7), press OFF/ON Soft Function Key F1 until Average (7) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (7) displays ***OFF***.

5. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (8), press OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 40.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***OFF***.

6. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (9), press OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 40.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***OFF***.

7. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (10), press OFF/ON Soft Function Key F1 until Alarm (10) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (10) displays ***OFF***.

8. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

1. With cursor on SINAD/Distortion/ Modulation Meter Label (1), press ZOOM Soft Key F1. Full Screen Distorion Meter is displayed.

2. If Peak Hold Function is desired, do not select Autorange. Configure as follows:

   - With cursor on Peak Hold (6), press OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (6) displays ***OFF***.

3. If Average Function is desired, configure as follows:

   - With cursor on Average (7), press OFF/ON Soft Function Key F1 until Average (7) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (7) displays ***OFF***.

4. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (8), press OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0% to 20%.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (8) displays ***OFF***.

5. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (9), press OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0% to 20%.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (9) displays ***OFF***.

6. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (10), press OFF/ON Soft Function Key F1 until Alarm (10) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (10) displays ***OFF***.

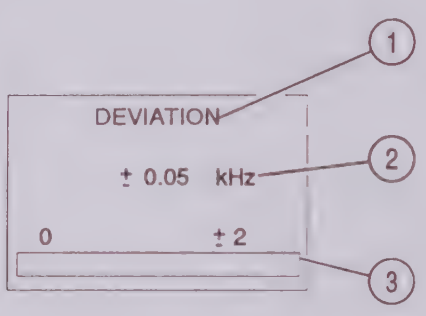
7. If desired instrument is not shown, press ANALY/SCOPE Soft Function Key F2.

8. If displayed, press RETURN Soft Function Key F6 to return to RF Receive Operation Screen. Alternately, press REC MODE Key to return to RF Receive Operation Screen.

D. FM DEVIATION METER

The FM Deviation Meter for the RF Receiver measures FM Deviation for an RF Signal. Filtering, for the signal passed to the FM Deviation Meter, is provided by the Audio/ Data Filters.

Configure and operate the FM Deviation Meter as follows:



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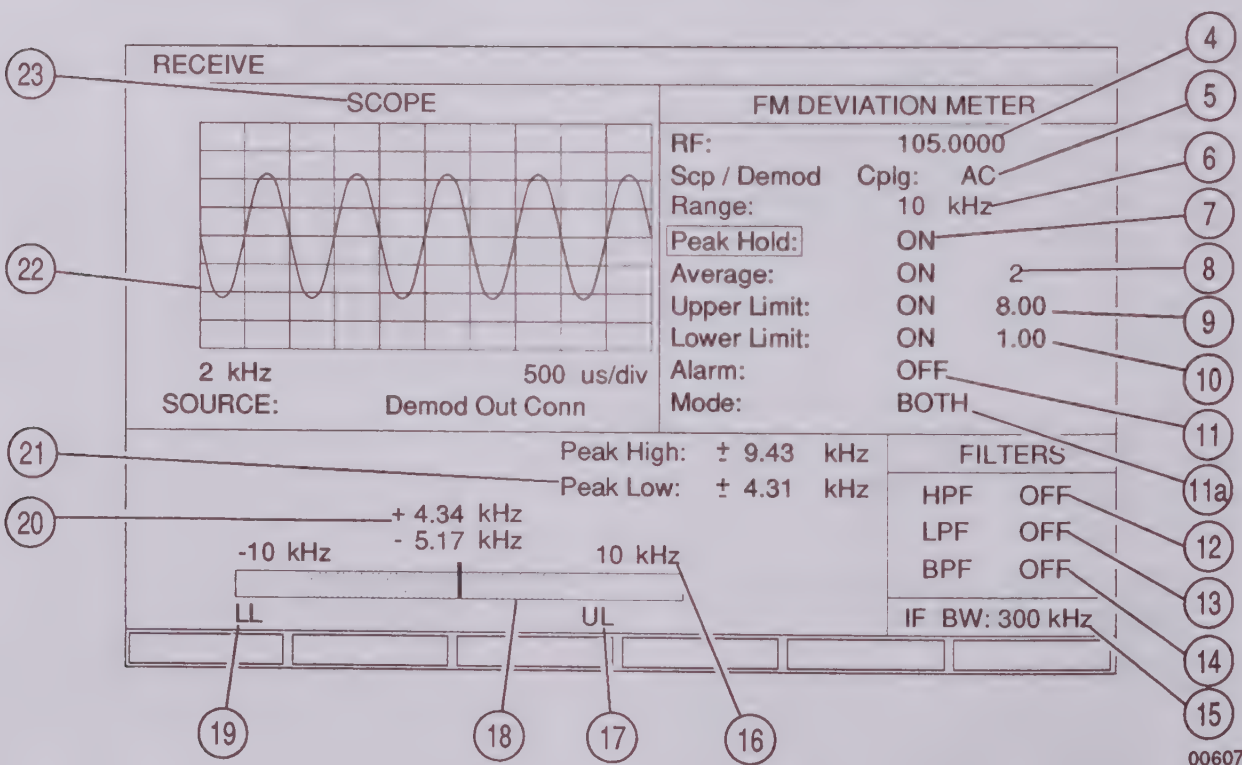

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K. OSCILLOSCOPE OPERATION SCREEN

The RF Receive Oscilloscope is usable as an abbreviated Oscilloscope and as a Full Screen Oscilloscope. Configuring one is reflected in the other.

The abbreviated Oscilloscope, as shown below, is visible from the RF Receive Operation Screen and the following meters:

SINAD Meter Operation Screen
Distortion Meter Operation Screen
FM Deviation Meter Operation Screen
Phase Modulation Meter Operation Screen
RF Power Meter Operation Screen
Received Level Meter Operation Screen
RF Frequency Error Meter Operation Screen
Audio Frequency Counter Operation Screen

Parameters set on any of the Operation Screens are reflected in all. Configuring the abbreviated Oscilloscope is as follows:

1. Select Sweep (3). Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

Press ROLL Soft Function Key F2 to view the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher. Press SLOW Soft Function Key F2 to return to the normal mode of operation.

2. Select SCOPE SOURCE (4). Selections include:

SCOPE SOURCE (4)	Signal Input	Signal Type
Scope/DVM-GND	SCOPE/DVM Connector	External Ground-Coupled Signal
Scope/DVM-AC	SCOPE/DVM Connector	External AC-Coupled Signal
Scope/DVM-DC	SCOPE/DVM Connector	External DC-Coupled Signal
AF Cntr	Audio Frequency Counter Signal	Demodulated Signal passed through filters to Audio Frequency Counter.
Notch Residual	Internal Filtered Signal	Notch Filtered Signal passed to SINAD and Distortion Meters. Reading is relative with no units applied.
Audio/Data/Gen Out	AUDIO/DATA OUT Connector	Composite signal of Audio/Data Generators
DTMF/SINAD	Signal applied to Audio Frequency Decoder, SINAD and Distortion Meters	Demodulated Signal passed through filters to Audio Frequency Decoder, SINAD and Distortion Meters
Data Decoder	Signal applied to Data Decoder	Demodulated Signal passed through filters to Data Decoder
RF Power	RF Power Meter Input	Relative to detected signal applied to RF Power Meter
Detector Out	Demodulated Audio	Unfiltered Demodulated Signal
Demod Out Connector	DEMOD Connector	Filtered Demodulated Signal applied to DEMOD Connector
Mod Meters	Modulation Meters source	Filtered Demodulated Signal applied to selected Modulation Meter.

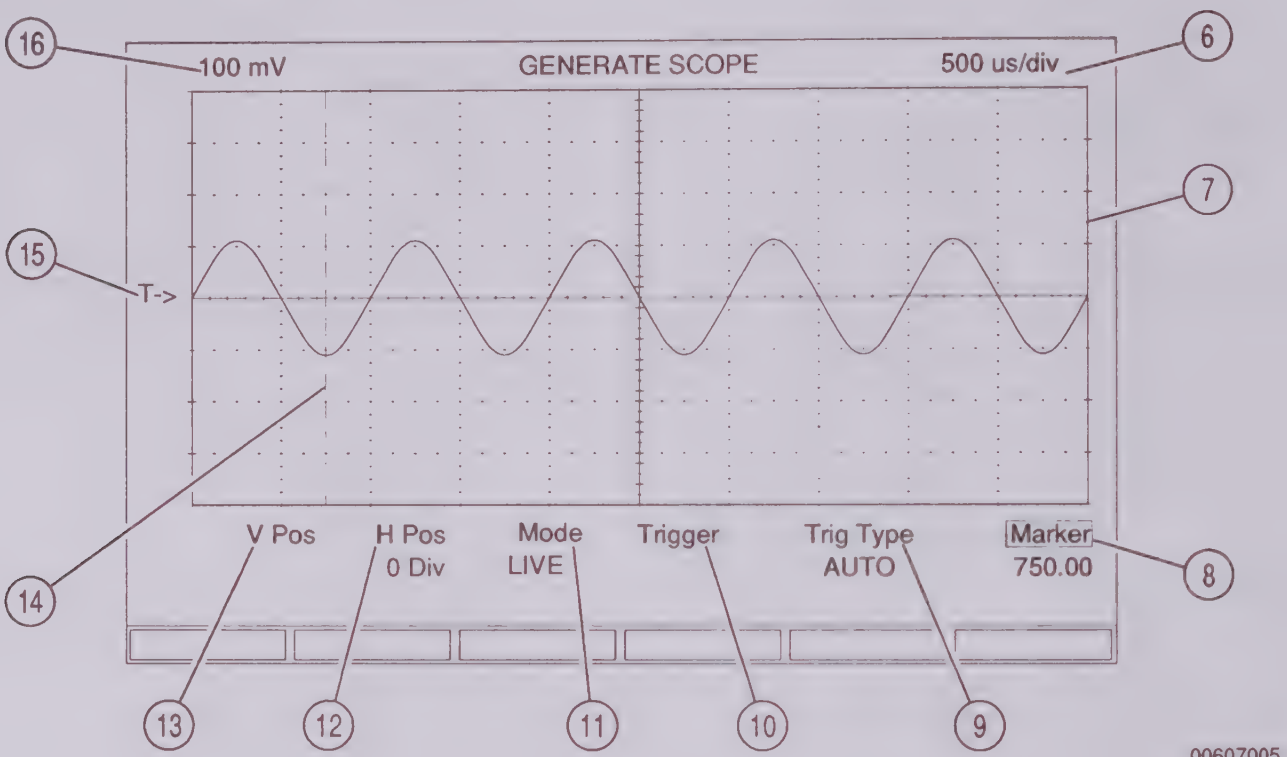
3. Select Oscilloscope Scale. Selections include:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
AF Cntr	0.02, 0.04, 0.10, 0.20, 0.40, 1.00

SCOPE SOURCE (4)	Available Scales
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data/Gen Out	20, 40, 100, 200, 400 mV 1 V
DTMF/SINAD	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
Data Decoder	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
RF Power	Low, Med, High (Selection is automatic depending on power provided to T/R Connector)

SCOPE SOURCE (4)	Available Scales
Detector Out	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
Demod Out Connector	.02, .04, .1, .2, .4, 1.00
Mod Meters	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians

Pressing ZOOM Soft Function Key F1 accesses full screen Oscilloscope, when cursor is on SCOPE/ANALYZER Prompt (1) of RF Receive Operation Screen and abbreviated Oscilloscope is displayed. Scope Source (4) must be selected before Full Screen Oscilloscope is accessed. Configuring the full screen Oscilloscope is as follows:



1. Select Sweep (6). Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

   - Press ROLL Soft Function Key F2 to view the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.
   - Press SLOW Soft Function Key F2 to return to the normal mode of operation.

2. Select Trigger Type (9) as follows:
   - Press NORM Soft Function Key F1 to select Normalized Trigger.
   - Press AUTO Soft Function Key F2 to select Auto Trigger.
   - Press 1 SHOT Soft Function Key F3 to select One Shot Trigger. Press 1 SHOT Soft Function Key F3 as needed to reset Trigger.

3. Set Trigger (10) using DATA SCROLL Spinner or DATA SCROLL Keys. Trigger Level (15) displays level required to trigger Oscilloscope in 1 SHOT or NORM.

4. Select Operation Mode (11) as follows:
   - Press MENU Soft Function Key F1 to access Operation Mode menu selections.

- Press LIVE Soft Function Key F1 to select Live Operation Mode.
- Press RECALL Soft Function Key F2 to select Recall Operation Mode.
- Press COMPARE Soft Function Key F3 to select Compare Operation Mode.
- Press LIVE-REF Soft Function Key F4 to select Live-Ref Operation Mode.
- Press REF-LIVE Soft Function Key F5 to select Ref-Live Operation Mode.
- Press RETURN Soft Function Key F6 to exit to Generate Scope.

- Press AVG Soft Function Key F2 to select Average Operation Mode.
- Press PK HOLD Soft Function Key F3 to select Peak Hold Operation Mode.
- Press MIN HOLD Soft Function Key F4 to select Minimum Hold Operation Mode.
- Press STORE Soft Function Key F6 to store current trace.

5. Select H POS (12) Offset as needed. Range is -10 to 10 Divisions.

6. Set Vertical Position of trace as needed by accessing V POS (13) and editing with DATA SCROLL Keys or DATA SCROLL Spinner.

7. Select Oscilloscope Scale (16). Selections available are dependent on Scope Source (4). Selections include:

SCOPE SOURCE (4)	Available Scales
Scope/DVM-GND	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-AC	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div
Scope/DVM-DC	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V
AF Cntr	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Notch Residual	0.02, 0.04, 0.10, 0.20, 0.40, 1.00
Audio/Data/Gen Out	20, 40, 100, 200, 400 mV 1 V
AF Dec/SINAD	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
Data Decoder	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
RF Power	Low, Med, High (Selection is automatic depending on power provided to T/R Connector)
Detector Out	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians
Demod Out Connector	.02, .04, .1, .2, .4, 1.00
Mod Meters	FM DEMOD TYPE - 1, 2, 5, 10, 20, 50 kHz AM DEMOD TYPE - 20% PM DEMOD TYPE - 0.1, 0.2, 0.5, 1, 2, 5 Radians

8. Activate Marker (14), as required, as follows:

   - With Cursor on Marker Position (8), press On/Off Soft Function Key F1.
   - Enter Desired Marker Position using DATA ENTRY Keys or DATA SCROLL Keys and/or DATA SCROLL Spinner.

L. SPECTRUM ANALYZER OPERATION SCREEN

The RF Receive Spectrum Analyzer is usable as an abbreviated Spectrum Analyzer or as a Full Screen Spectrum Analyzer. Configuring one is reflected in the other.

The abbreviated Spectrum Analyzer, as shown below, is visible from the RF Receive Operation Screen and the following Meters:

SINAD Meter Operation Screen
Distortion Meter Operation Screen
FM Deviation Meter Operation Screen
AM Modulation Meter Operation Screen
Phase Modulation Meter Operation Screen
RF Power Meter Operation Screen
Received Level Meter Operation Screen
RF Frequency Error Meter Operation Screen
Audio Frequency Counter Operation Screen

Parameters set on any of the above Operation Screens are reflected in all. Configuring the abbreviated Spectrum Analyzer is as follows:

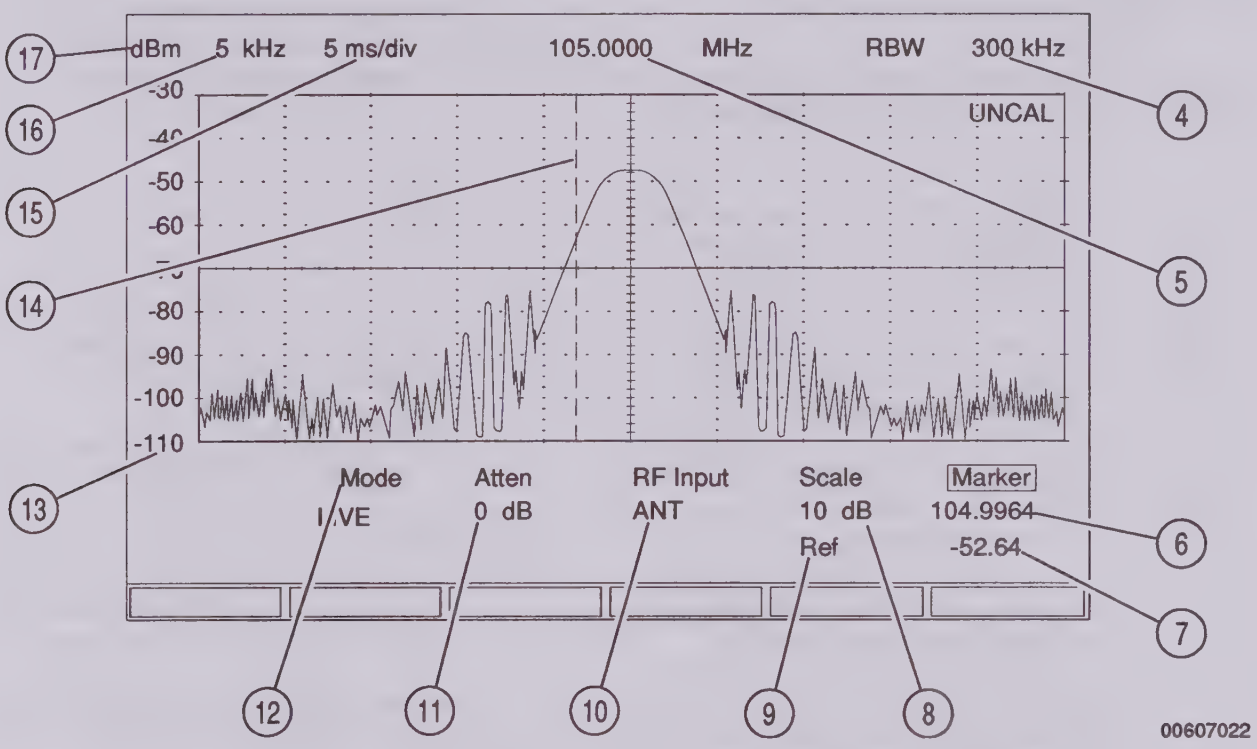
1. Select Scan Width (3). Selections include zero scan and:

1 kHz	2 kHz	5 kHz
10 kHz	20 kHz	50 kHz
100 kHz	200 kHz	500 kHz
1 MHz		

Press MENU Soft Function Key F1 to access a scan width menu. Press RETURN Soft Function Key F6 to exit to normal operation.

Press CONFIG Soft Function Key F2 to access a pop up screen to configure scan width. Press COUPLE Soft Function Key F1 to set the sweep and RBW to factory default state for the current scan width. Press RETURN Soft Function Key F6 to exit to normal operation.

Pressing ZOOM Soft Function Key F1 accesses full screen Spectrum Analyzer, when cursor is on SCOPE/ANALYZER Prompt (1) of RF Receive Operation Screen and abbreviated Spectrum Analyzer is displayed. Available features and parameters are described below:



1. Set Center Frequency (5). Press Set Ref Soft Function Key F1 if current Center Frequency is to used as Reference Frequency.

2. Select Scan Width (15). Selections include zero scan and:

1 kHz	2 kHz	5 kHz
10 kHz	20 kHz	50 kHz
100 kHz	200 kHz	500 kHz
1 MHz	2 MHz	5 MHz
10 MHz	20 MHz	50 MHz
100 MHz		

3. Set Logarithmic Function (16) as follows:

   - Press dBm Soft Function Key F1 to select dBm.
   - Press dBµV Soft Function Key F2 to select dBµV.
   - Press dBmV Soft Function Key F3 to select dBmV.
   - Press dBV Soft Function Key F4 to select dBV.
   - Press dBµW Soft Function Key F5 to select dBµW.
   - Press dBW Soft Function Key F6 to select dBW.

4. Set Scale (8) as follows:

   - Press 10 dB Soft Function Key F1 to select 10 dB for Vertical Scale (13).

- Press 2 dB Soft Function Key F2 to select 2 dB for Vertical Scale (13).

5. Select Mode (12) as follows:

   - Press MENU Soft Function Key F1 to access Operation Mode menu selections.

     - Press LIVE Soft Function Key F1 to select Live Operation Mode.

     - Press RECALL Soft Function Key F2 to select Recall Operation Mode.

     - Press COMPARE Soft Function Key F3 to select Compare Operation Mode.

     - Press LIVE-REF Soft Function Key F4 to select Live-Ref Operation Mode.

     - Press REF-LIVE Soft Function Key F5 to select Ref-Live Operation Mode.

     - Press RETURN Soft Function Key F6 to exit to Generate Analyzer.

   - Press AVG Soft Function Key F2 to select Average Operation Mode.

   - Press PK HOLD Soft Function Key F3 to select Peak Hold Operation Mode.

   - Press MIN HOLD Soft Function Key F4 to select Minimum Hold Operation Mode.

   - Press STORE Soft Function Key F6 to store the current trace.

6. Activate Marker (14), as required, as follows:

   - With Cursor on Marker Position (6), press On/Off Soft Function Key F1.

   - Enter Desired Marker Position using DATA ENTRY Keys or DATA SCROLL Keys and/or DATA SCROLL Spinner.

7. Access Ref (9) Field to adjust Vertical Scale (13), as needed.

8. Select RF Input (10) as needed.

   - Press T/R Soft Function Key F1 to select T/R Connector.

   - Press ANT Soft Function Key F2 to select ANTENNA Connector.

9. Select Attenuation (11) as needed.

   - Press 30 dB Soft Function Key F1 to select 30 dB Attenuation.

   - Press 0 dB Soft Function Key F2 to select 0 dB Attenuation.

10. If Scan Width (15) is set to zero scan, enter Zero Scan Sweep (17). Selections Include:

200 µs/div	500 µs/div	1 ms/div
2 ms/div	5 ms/div	10 ms/div
20 ms/div	50 ms/div	100 ms/div
200 ms/div	500 ms/div	

   - Press MENU Soft Function Key F1 to access the sweep menu. Press RETURN to exit into normal operation.

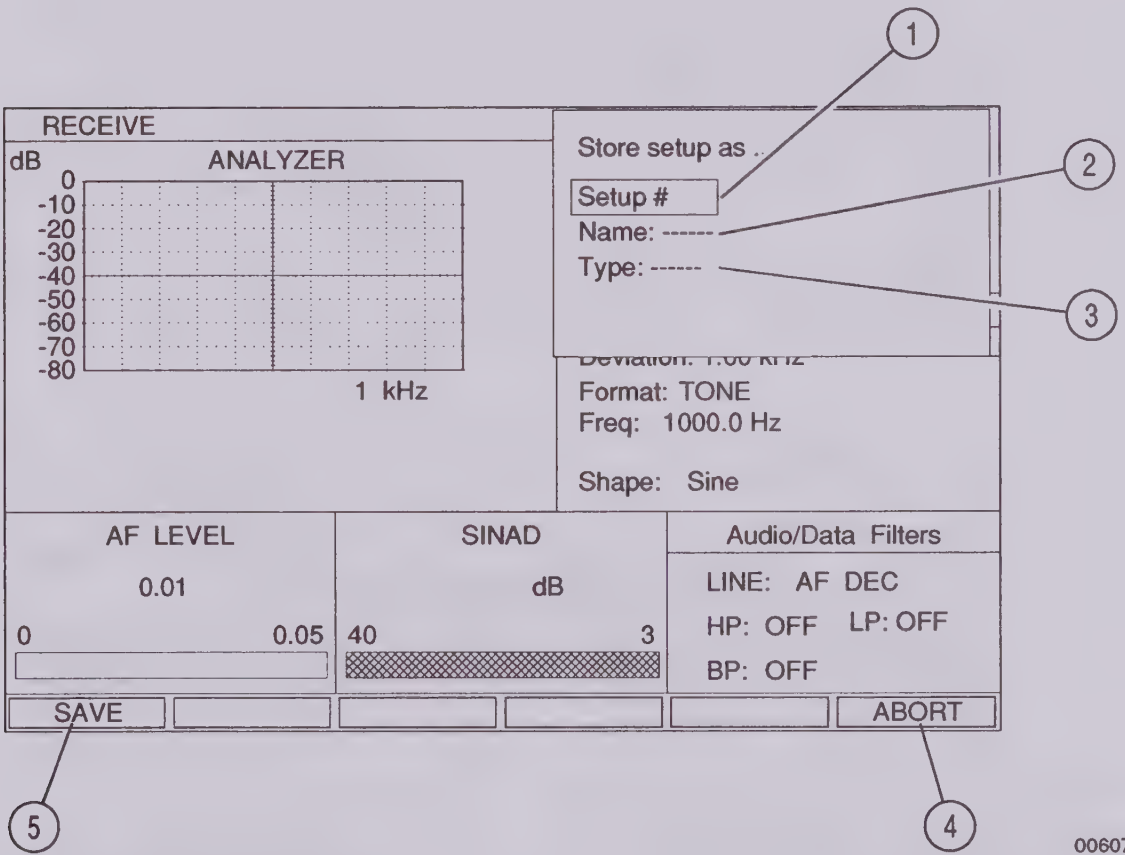
   - Press DEFLT Soft Function Key F5 to set only the current field to factory default.

   - Press COUPLE Soft Function Key to set the sweep and RBW to factory default state for the current scan width.

M. STORE AND RECALL OPERATION

Pressing STORE Memory Key allows the operator to store up to 100 RF Receive Operation Screen configurations. Storage Locations 0 through 49 can be used to store a RF Generate Operation configuration, a RF Receive Operation configuration or a Duplex Operation configuration (Receive and Generate pair).

STORE Operation for the RF Receive Operation is as follows:



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1. Press STORE MEMORY Key.

2. Enter Setup # (1) value. Range is 0 to 49. Press ENTER Key.

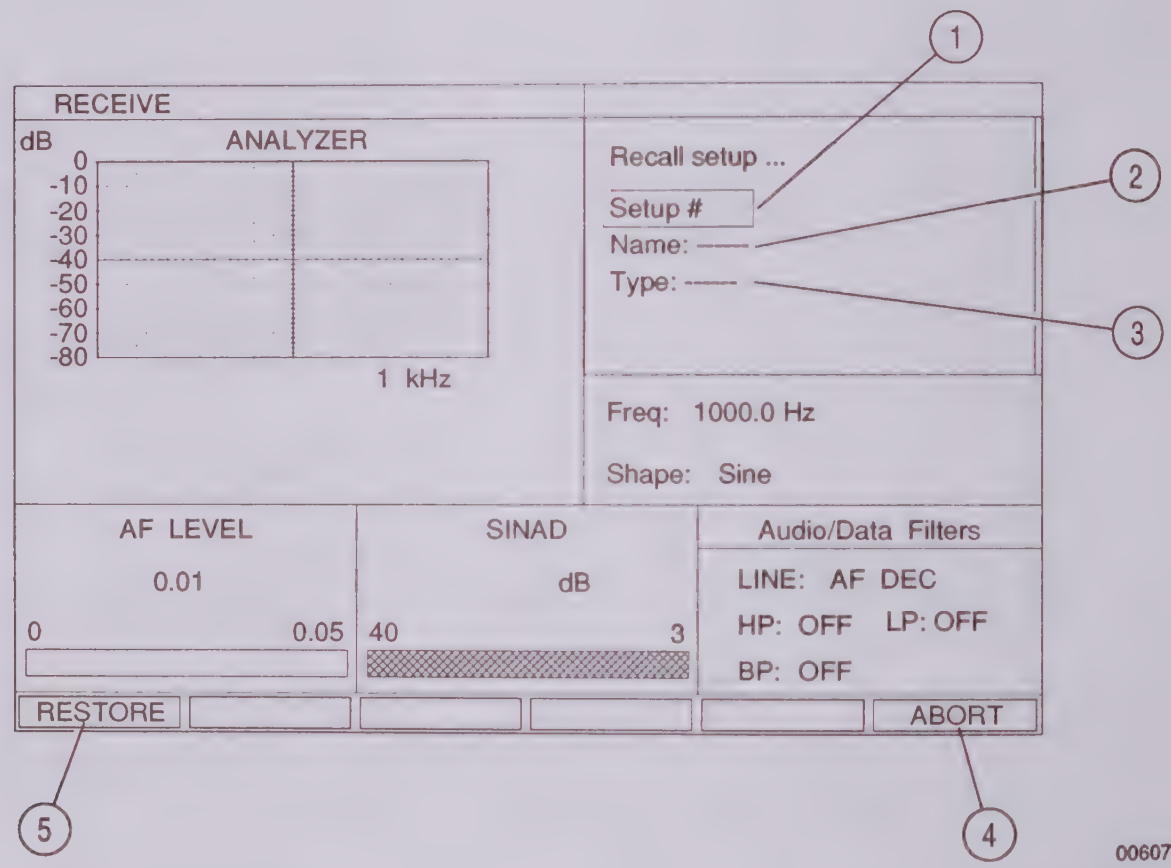
3. If Name (2) is desired, press ENTER Key, with Cursor on Memory Location Label (2) field. Enter Label using DATA ENTRY Keys. Label can be alphabetic and/or numeric characters. Press ENTER Key.

4. Type (3) displays the type of data saved in the specified setup number. Types to save and recall are: DUPLEX, GENERATOR, RECEIVER, GENERATOR & RECEIVER and EMPTY.

5. Press SAVE Soft Function Key F1 (5) to accept selections and save Setup. Press ABORT Soft Function Key F6 (4) to escape without saving Setup.

Pressing RCL Memory Key allows the operator to recall up to 50 previously stored operation screens. RF Receive, RF Generate or Duplex Operation Screen configurations can all be accessed from the RF Generate Operation Screen. Accessing anything other than an RF Generate Operation Screen configuration, automatically switches the COM-120B to the selected mode of operation.

RECALL Operation for the RF Receive Operation is as follows:



1. Press RECALL MEMORY Key.

2. Enter Setup # (1) value. Range is 0 to 49. Press ENTER Key.

3. Press RESTORE Soft Function Key F1 (5) to accept selections and recall Setup. Press ABORT Soft Function Key F6 (4) to escape without recalling Setup.

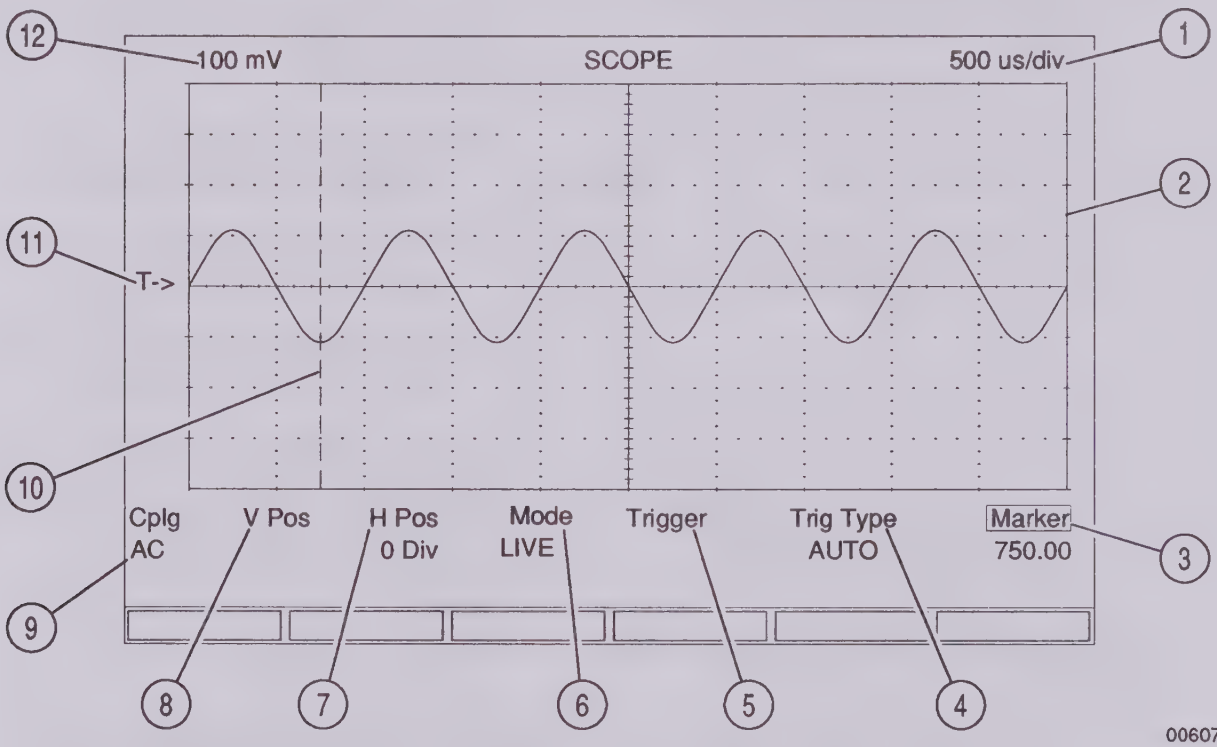
4. Type (3) displays the type of data saved in the specified setup number. Types to save and recall are: DUPLEX, GENERATOR, RECEIVER, GENERATOR & RECEIVER and EMPTY.

5. Press RESTORE Soft Function Key F1 (5) to accept selections and save Setup. Press ABORT Soft Function Key F6 (4) to escape without recalling Setup.

4-5 OSCILLOSCOPE OPERATION SCREEN

Pressing the SCOPE INSTRUMENTS Key accesses the Oscilloscope Operation Screen. The purpose of the Independent Oscilloscope is to provide a test instrument that is independent of the other Operation Modes. What this section does is provide information for configuring the Oscilloscope in a generic sense. It is provided to explain how the active fields are edited and what selections are available. It is not designed to perform a specific test, but instead is provided as a reference for configuring the Independent Oscilloscope Operation Screen.

Configure and operate the Independent Oscilloscope Operation Screen as follows:



1. Select Sweep (1). Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

- Press ROLL Soft Function Key F2 to view the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.
- Press SLOW Soft Function Key F2 to return to the normal mode of operation.

2. Select Trigger Type (4) as follows:
   - Press NORM Soft Function Key F1 to select Normalized Trigger.
   - Press AUTO Soft Function Key F2 to select Auto Trigger.
   - Press 1 SHOT Soft Function Key F3 to select One Shot Trigger. Press 1 SHOT Soft Function Key F3 as needed to reset Trigger.
3. Set Trigger Level (11) as follows:
   - Move cursor to Trigger (5).

- Press ENTER Key.
- Use DATA SCROLL Spinner or DATA SCROLL Keys to set Trigger.
- Press ENTER Key to complete edit.

4. Select Operation Mode (6) as follows:
   - Press MENU Soft Function Key F1 to access Operation Mode menu selections.
     - Press LIVE Soft Function Key F1 to select Live Operation Mode.
     - Press RECALL Soft Function Key F2 to select Recall Operation Mode.
     - Press COMPARE Soft Function Key F3 to select Compare Operation Mode.
     - Press LIVE-REF Soft Function Key F4 to select Live-Ref Operation Mode.
     - Press REF-LIVE Soft Function Key F5 to select Ref-Live Operation Mode.
     - Press RETURN Soft Function Key F6 to exit to Scope Operation.
   - Press AVG Soft Function Key F2 to select Average Operation Mode.
   - Press PK HOLD Soft Function Key F3 to select Peak Hold Operation Mode.
   - Press MIN HOLD Soft Function Key F4 to select Minimum Hold Operation Mode.
   - Press STORE Soft Function Key F6 to store the current trace.
5. Select H POS (7) Offset as needed. Range is -10 to 10 Divisions.
6. Set Vertical Position of trace as needed by accessing V POS (8) and editing with DATA SCROLL Keys or DATA SCROLL Spinner.
7. Select Coupling (9). Selections include GND (Ground), AC and DC. Select as follows:
   - Press GND Soft Function Key F1 to select GND as Coupling (9).
   - Press AC Soft Function Key F2 to select AC as Coupling (9).
   - Press DC Soft Function Key F3 to select DC as Coupling (9).
8. Select Oscilloscope Scale (12). Selections available are dependent on Scope Source (4). Selections include:

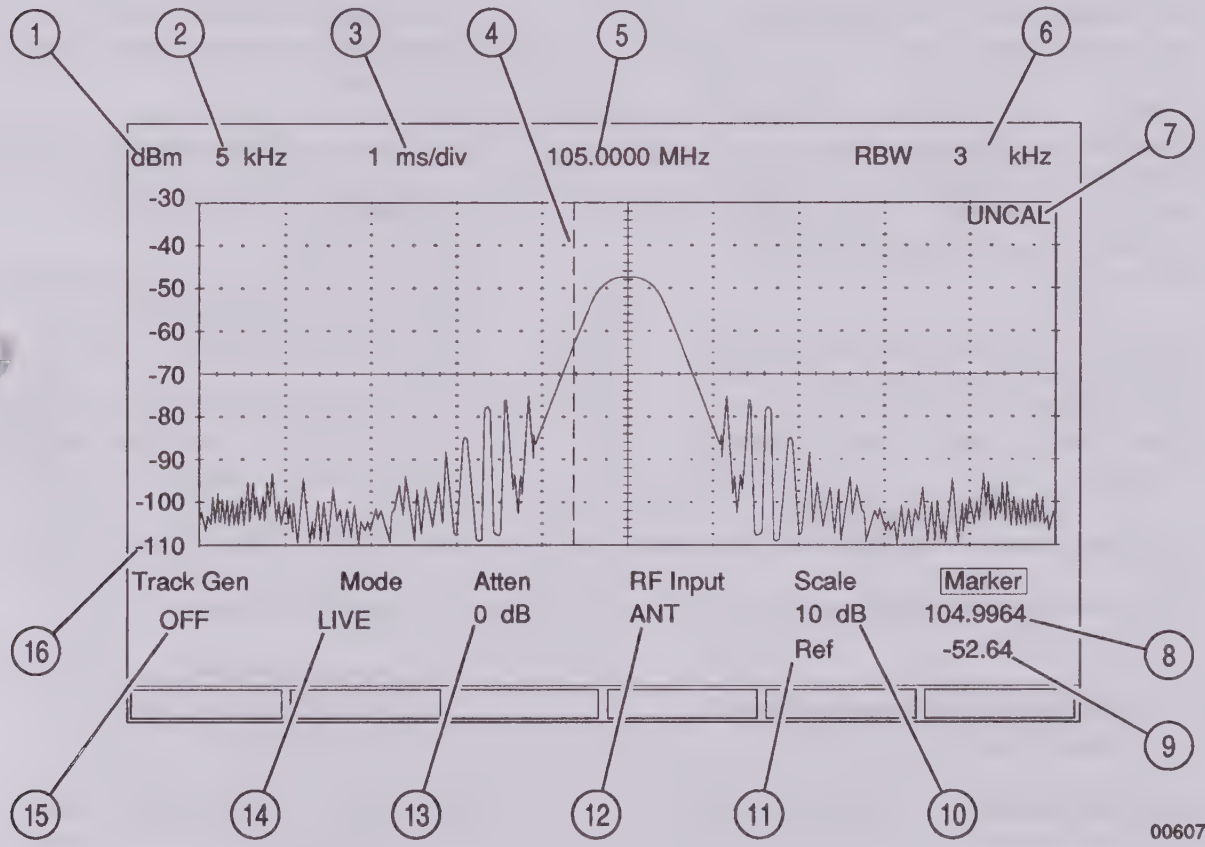
10 mV	20 mV	50 mV
100 mV	200 mV	500 mV
1 V	2 V	5 V
10 V	20 V	50 V

9. Activate Marker (10), as required, as follows:
   - With Cursor on Marker Position (3), press On/Off Soft Function Key F1.
   - Enter Desired Marker Position using DATA ENTRY Keys or DATA SCROLL Keys and/or DATA SCROLL Spinner.

4-6 SPECTRUM ANALYZER OPERATION SCREEN

Pressing the ANLYZ INSTRUMENTS Key accesses the Spectrum Analyzer Operation Screen. The purpose of the Independent Spectrum Analyzer is to provide a test instrument that is independent of the Operation Modes. What this section does is provide information in configuring the Spectrum Analyzer in a generic sense. It is provided to explain how the active fields are edited and what selections are available. It is not designed to perform a specific test, but instead is provided as a reference for configuring the Independent Spectrum Analyzer Operation Screen.

Configure and operate the Independent Spectrum Analyzer Operation Screen as follows:



1. Set Center Frequency (5). Press Set Ref Soft Function Key F1 if current Center Frequency is to be used as Reference Frequency. Press Split Soft Function Key F5 If Split Screen Operation is desired. If Find Function Operation is desired, configure as follows:

- Press Config Soft Function Key F4 to access Sweep Width Window. Enter Sweep Width. Press highlighted Config Soft Function Key F4 to close Window.

- Press Find Lvl Soft Function Key F3 to activate Marker for setting Find Level Reference. Use DATA SCROLL Spinner or DATA SCROLL Keys to edit Marker Level. Press Highlighted Find Lvl Soft Function Key F3 to complete operation.

- Press Find Soft Function Key F2 to activate Find Function.

2. Select Scan Width (2). Selections include zero scan and:

1 kHz	2 kHz	5 kHz
10 kHz	20 kHz	50 kHz
100 kHz	200 kHz	500 kHz
1 MHz	2 MHz	5 MHz
10 MHz	20 MHz	50 MHz
100 MHz		

The word "UNCAL" appears in the display when combinations of RBW, frequency span and sweep rate for which the analyzer is not calibrated are used.

3. Set Logarithmic Function (1) as follows:

- Press dBm Soft Function Key F1 to select dBm.

- Press dBµV Soft Function Key F2 to select dBµV.

- Press dBmV Soft Function Key F3 to select dBmV.

- Press dBV Soft Function Key F4 to select dBV.

- Press dBµW Soft Function Key F5 to select dBµW.

- Press dBW Soft Function Key F6 to select dBW.

4. Set Scale (10) as follows:

- Press 10 dB Soft Function Key F1 to select 10 dB for Vertical Scale (15).

- Press 2 dB Soft Function Key F2 to select 2 dB for Vertical Scale (13).

5. Select Mode (14) as follows:

- Press MENU Soft Function Key F1 to access Operation Mode menu selections.

  - Press LIVE Soft Function Key F1 to select Live Operation Mode.

  - Press RECALL Soft Function Key F2 to select Recall Operation Mode.

  - Press COMPARE Soft Function Key F3 to select Compare Operation Mode.

  - Press LIVE-REF Soft Function Key F4 to select Live-Ref Operation Mode.

  - Press REF-LIVE Soft Function Key F5 to select Ref-Live Operation Mode.

  - Press RETURN Soft Function Key F6 to exit to Analyzer Operation.

- Press AVG Soft Function Key F2 to select Average Operation Mode.

- Press PK HOLD Soft Function Key F3 to select Peak Hold Operation Mode.

- Press MIN HOLD Soft Function Key F4 to select Minimum Hold Operation Mode.

- Press STORE Soft Function Key F6 to store the current trace.

6. Activate Marker (4), as required, as follows:

   - With Cursor on Marker Position (8), press On/Off Soft Function Key F1.

   - Enter Desired Marker Position using DATA ENTRY Keys or DATA SCROLL Keys and/or DATA SCROLL Spinner.

7. Access Ref (11) Field to adjust Vertical Scale (14), as needed.

8. Select RF Input (12) as needed.

   - Press T/R Soft Function Key F1 to select T/R Connector.

   - Press ANT Soft Function Key F2 to select ANT Connector.

9. Select Attenuation (13) as needed.

   - Press 30 dB Soft Function Key F1 to select 30 dB Attenuation.

   - Press 0 dB Soft Function Key F2 to select 0 dB Attenuation.

10. Scan Sweep Selections Include:

200 µs/div	500 µs/div	1 ms/div
2 ms/div	5 ms/div	10 ms/div
20 ms/div	50 ms/div	100 ms/div
200 ms/div	500 ms/div	

4-7 AUDIO/DATA/SIGNALING GENERATORS

Pressing the AUDIO GEN INSTRUMENTS Key accesses the Independent Audio/Data/ Signaling Generators Operation Screen. The purpose of the Independent Audio/Data/ Signaling Generators is to provide baseband signal generators that are independent of the other Operation Modes. This section provides information on configuring the Audio/Data/Signaling Generators in the COM-120B. Configuring the Audio/Data/ Signaling Generators is covered in a generic sense. It is provided to explain how each of the active fields are edited and what selections are available. It is not designed to perform a specific test, but instead is provided as a reference.

The Audio/Data/Signaling Generators Operation Screen is composed of four sections, each of which represents a different generator. These generators are covered separately. Restrictions that apply to the generators are primarily related to the output level. The sum of the generators output level should not exceed 2.5 volts in X1 mode and 25 mV in /10 (divide by 10) mode. If /10 mode is selected, ALL signal generators are affected:

Audio Generator 1 Operation

Audio Generator 2 Operation

DATA Generator Operation

DTMF Generator Operation

- Press C-MSG Soft Function Key F2 to set Bandpass Filter (11) to C-Message Weighted Filter (*C-MSG*).

12. Set Scope Scale (18). Selections change depending on selected Source (1). Selections include:

Source (1)	Scale
RF POW	LOW (2 mW to 20 mW signal) MED (>20 mW to 2 W signal) HIGH (>2 W to 200 W signal
AUD/DAT or EXT MOD	100, 200, 500 mV 1, 2, 5 V
SC/DVM	10, 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50 V

13. Set Scope Sweep (19). Selections include:

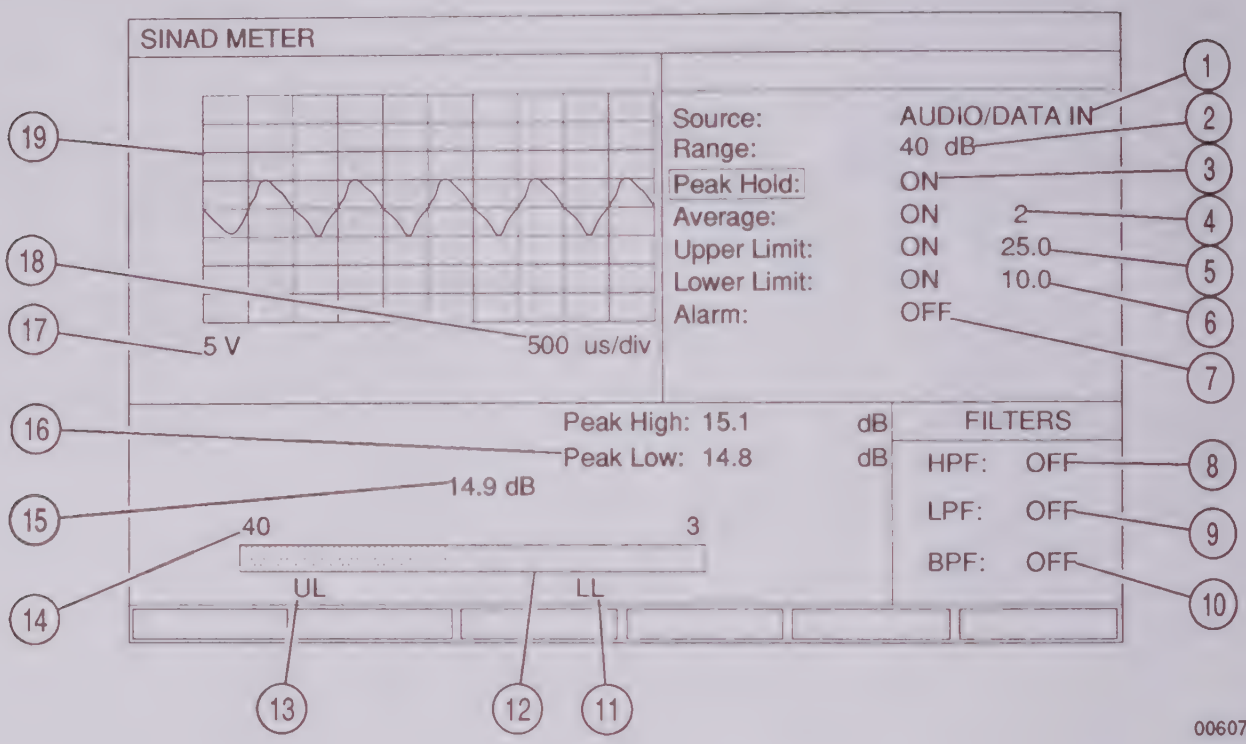
100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

- Press ROLL Soft Function Key F2 to view the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.

- Press SLOW Soft Function Key F2 to return to the normal mode of operation.

4-8-2 SINAD METER OPERATION

Configure and operate SINAD Meter as follows:



1. Select Source (1) as follows:

   - Press AUD/DAT Soft Function Key F1 to select AUDIO/DATA IN Connector as Source (1).
   - Press SC/DVM Soft Function Key F2 to select SCOPE/DVM Connector as Source (1).

2. Select Range (2) as follows:

   - Press 15 dB Soft Function Key F1 to select 15 dB as Range (2).
   - Press 40 dB Soft Function Key F2 to select 40 dB as Range (2).
   - Press AUTO Soft Function Key F3 to select Autorange for Range (2).

3. If Peak Hold Function is desired, do not select Autorange. Configure as follows:

   - With cursor on Peak Hold (3), press OFF/ON Soft Function Key F1 until Peak Hold (3) displays ***ON***.
   - Peak Hold Function can be reset as desired by pressing RST PK Soft Function Key F5 where displayed.
   - Set Peak Hold Function to OFF by pressing OFF/ON Soft Function Key F1 until Peak Hold (3) displays ***OFF***.

4. If Average Function is desired, configure as follows:

   - With cursor on Average (4), press OFF/ON Soft Function Key F1 until Average (4) displays ***ON*** and Sample Number appears.
   - Enter Sample Number. Range is 2 to 10.
   - Set Average Function to OFF by pressing OFF/ON Soft Function Key F1 until Average (4) displays ***OFF***.

5. If Upper Limit Function is desired, configure as follows:

   - With cursor on Upper Limit (5), press OFF/ON Soft Function Key F1 until Upper Limit (5) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 40.
   - Set Upper Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Upper Limit (5) displays ***OFF***.

6. If Lower Limit Function is desired, configure as follows:

   - With cursor on Lower Limit (6), press OFF/ON Soft Function Key F1 until Lower Limit (6) displays ***ON*** and Limit Value appears.
   - Enter Limit Value. Range is 0 to 40.
   - Set Lower Limit Function to OFF by pressing OFF/ON Soft Function Key F1 until Lower Limit (6) displays ***OFF***.

7. If Alarm Function is desired, configure as follows:

   - With cursor on Alarm (7), press OFF/ON Soft Function Key F1 until Alarm (7) displays ***ON***.
   - Set Alarm Function to OFF by pressing OFF/ON Soft Function Key F1 until Alarm (7) displays ***OFF***.

8. Set High-Pass Filter (8) as follows:

   - Press OFF Soft Function Key F1 to set High-Pass Filter (8) to ***OFF***.
   - Press 300 Hz Soft Function Key F2 to set High-Pass Filter (8) to ***300 Hz***.
   - Press 4 kHz Soft Function Key F3 to set High-Pass Filter (8) to ***4 kHz***.

9. Set Low-Pass Filter (9) as follows:

   - Press OFF Soft Function Key F1 to set Low-Pass Filter (9) to ***OFF***.
   - Press 300 Hz Soft Function Key F2 to set Low-Pass Filter (9) to ***300 Hz***.
   - Press 4 kHz Soft Function Key F3 to set Low-Pass Filter (9) to ***4 kHz***.
   - Press 20 kHz Soft Function Key F4 to set Low-Pass Filter (9) to ***20 kHz***.

10. Set Bandpass Filter (10) as follows:

    - Press OFF Soft Function Key F1 to set Bandpass Filter (10) to ***OFF***.
    - Press C-MSG Soft Function Key F2 to set Bandpass Filter (10) to C-Message Weighted Filter (***C-MSG***).

11. Set Scope Scale (12). Selections change depending on selected Source (1). Selections include:

Source (1)	Scale
AUD/DAT	100, 200, 500 mV 1, 2, 5 V
SC/DVM	10, 20, 50, 100, 200, 500 mV/Div 1, 2, 5, 10, 20, 50 V/Div

12. Set Scope Sweep (18). Selections include:

100 µs/div	200 µs/div	500 µs/div
1 ms/div	2 ms/div	5 ms/div
10 ms/div	20 ms/div	50 ms/div
100 ms/div	200 ms/div	500 ms/div

- Press ROLL Soft Function Key F2 to view the scope trace in a roll mode when the selected sweep rate is 100 ms/div or higher.

- Press SLOW Soft Function Key F2 to return to the normal mode of operation.

5-3 MANDATORY IEEE 488.2 COMMANDS

Mnemonic	Command
*CLS	Clear Status Command
*ESE X	Standard Event Status Enable, x = 0 to 255
*ESE?	Standard Event Status Enable Query
*ESR?	Standard Event Status Register Query
*IDN?	Identification Query
*OPC	Operation Complete Command
*OPC?	Operation Complete Query
*OPT?	Returns Software Option of Test Set
*RST	Restart Command
*SRE X	Service Request Command, x = 0 to 255
*SRE?	Service Request Enable Query
*STB?	Read Status Byte Query
*TST?	Self Test Query
*WAI	Wait-To-Continue Command

Mandatory GPIB Commands

5-4 COM-120B SPECIFIC COMMANDS

The following list of commands is broken up by function. All string values must be entered within Quotation marks (" "). Within the list, the commands are listed in hierarchal order. Each hierarchy is separated by a colon(:). For example, the command "RECeiver:INPut:ATTenuation 30" is listed as follows:

```
R ECeiver
   :INPut
      :ATTenuation v                                   Set input ATTenuation.
```

The v is a variable parameter. At least one space is required between commands and parameters. When more than one parameter is required, they are separated by a comma (,). The example given is a command to set the COM-120B. Another type of command used is a Query Command. Query Commands contain a question mark (?) at the end of the command and before any parameters.

Commands are listed in upper and lower case letters. This is to identify the short and long form of the command. The upper case letters identify the short form of the command. The upper and lower case letters, together, identify the long form of the command.

ANALYZER COMMANDS

NOTE1: Assumed units are MHz. Valid units are Hz, kHz, MHz or GHz. Accepted frequency range is from 250 kHz through 1 GHz in 0.1 kHz steps.

ANALyzer		
:ADJust		Adjusts vertical scale using internal -40 dB reference signal.
:BANDwidth v[units]		Sets the Resolution Bandwidth of the analyzer. v may be: 300 Hz, 3 kHz, 30 kHz, 300 kHz or 3 MHz. [units] may be Hz, kHz, or MHz. The default is Hz.
:DEFault		Sets the Resolution Bandwidth to the default value for the current analyzer SPAN-width.
:RESolution v[units]		Identical to BAND. Included for SCPI standard.
:BANDwidth?		Returns the current analyzer Resolution Bandwidth.
:FIND		
:INITiate		Starts Find function.
:LEVel v	0 to 255	Sets Find level in pixels. Top of Screen is 255.
:LEVel?		Queries Find level.
:SWEep		
:WIDth v	.2000 to 500.0000	Sets Find sweep width in MHz with .0001 MHz increments.
:WIDth?		Returns sweep width in MHz.
:FREQuency v[units]	.0000 to 1000.0000	Sets Center Frequency . See Note 1.
:FREQuency?		Queries Center Frequency.
:INPut		
:ANTenna		Sets ANTENNA Connector as input.
:ATTenuation v	0 or 30	Sets input ATTenuation in dB.
:ATTenuation?		Queries input ATTenuation.
:TR		Sets T/R Connector as input.
:INPut?		Queries selected input connector.
:MARKer		
:AMPLitude?		Queries level at active marker location.

ANALyzer		
:MARKer		
:FREQuency v[units]		Sets marker frequency. Range of value is dependent on scan width. Marker frequency must be in displayed frequency window. See Note 1.
:FREQuency?		Queries Marker Frequency.
:STATe b	0 or 1	Sets Marker to ON or OFF.
:STATe?		Queries Marker state.
:MODE	AVERage	Sets Mode to Average.
	COMPare	Sets Mode to Compare.
	LIVE	Sets Mode to Live.
	LMINus	Live minus (i.e. Reference-Live).
	MINhold	Sets Mode to Min Hold.
	PEAKhold	Sets Mode to Peakhold.
	RECAll	Recalls stored trace.
	RMINus	Reference minus (i.e. Live-Reference).
	STORe	Stores current trace in memory.
:MODE?		Queries Mode Type.
:REFerence		
:LEVel v		Sets Reference Level. Range is dependent on Scale. Range is 0 to 2 in 10 dB mode. Range is 0 to 64 in 2 dB mode.
:LEVel?		Queries Reference Level.
:SCALe v	2 or 10	Sets Scale in dB.
:UNITs	DBM	Sets Scale Units to dBm.
	DBW	Sets Scale Units to dBW.
	DBMV	Sets Scale Units to dBmV.
	DBUV	Sets Scale Units to dBµV.
	DBUW	Sets Scale Units to dBµW.
	DBV	Sets Scale Units to dBV.
:UNITs?		Queries Units selected.
:SCALe?		Returns Scale value.
:SPAN v[units]	1, 2, 5, 10, 20, 50,	Sets Spanwidth. Assumed units are kHz.
:SPAN	100, 200, 500 kHz, 1, 2, 5, 10, 20, 50, 100 MHz	Accepted units are kHz and MHz.
:DEFault		Sets the Sweep Rate and Resolution Bandwidth to the default values for the current SPAN-width.
:SPAN?		Returns Spanwidth value and units.
:SPLIT		Sets the analyzer to Split-mode of operation. Only applies to independent analyzer. Does not update screen.
:NORMAL		Sets the analyzer to Normal-mode of operation. Only applies to independent analyzer. Does not update screen.
:SWEEP v[units]		Sets the analyzer sweep rate per division. v may be: 200 µs, 500 µs, 1 ms, 2 ms, 5 ms, 10 ms, 20 ms, 50 ms, 100 ms, 200 ms, or 500 ms. [units] may be: microseconds or milliseconds. Microseconds is the default.
:TIME v[units]		Identical to SWEEP. Included for SCPI standard.
:DEFault		Sets the Sweep Rate to the default value for the current analyzer SPAN-width.
:SWEEP?		Returns the current analyzer sweep rate.
:TRACe		
:DATA?[v1,v2,v3]		Queries current data trace values. v1 specifies Mode (0[live], 1[recall], 2[peakhold]). v2 specifies start point in pixels, with range of 0 to 499. v3 specifies number of returned points in pixels with range of 0 to 499, where v1 + v2 ®500. Defaults are 0,0,500.

ANALyzer		
:TRACKgen b	0 or 1	Sets Tracking Generator to ON or OFF. Requires Option 12.
:LEVel v	-130 to +13 dBm	Sets Tracking Generator level in dBm.
:LEVel?		Queries Tracking Generator level.
:TRACKgen?		Queries Tracking Generator state.

BER COMMANDS

Refer to Measure Commands for initiating BER Meter operation and obtaining data. Send SYST:KEY:STOP command to halt BER Meter operation.

BER		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm status.
:BAUD v	75, 150, 300, 600, 1200, 2400, 4800, 9600	Sets baud rate of data transfer.
:BAUD?		Queries baud rate for data transfer.
:COUPling	AC or DC	Sets coupling for input signal.
:COUPling?		Queries Coupling status.
:FM		
:RANGe v[units]	10, 20, 50, 100	Sets Deviation Range in kHz.
:RANGe?		Queries Deviation Range.
:INPut	AUDIN	Sets Input to Audio Data In.
	DEMODulation	Sets input to demodulated signal.
:INPut?		Queries input setting.
:MODE		
:CONTinuous		Sets BER Meter to loop continuously.
:LOOP v	1 to 100000	Sets BER Meter to loop for specified number of tests.
:LOOP?		Queries number of loops for LOOP Mode.
:MODE?		Queries Mode type.
:OUTPut	AUDOUT	Sets output to AUDIO/DATA GEN Connector.
	GENerator	Sets output to RF Generator.
:OUTPut?		Queries output destination.
:PATTern	FIXed	Sets Data Pattern to Fixed.
	RANDom	Sets Data Pattern to Random.
:PATTern?		Queries Data Pattern type.
:PEAKhold		
:MAXimum?		Queries Maximum Peak Hold value.
:RESet		Resets Peak Hold function.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF
:STATe?		Queries Peak Hold setting.
:POLarity	INVerted	Sets Data Polarity to Inverted.
	NORmal	Sets Data Polarity to Normal.
:POLarity?		Queries DAta Polarity.
:SIZE v	128 to 100000	Sets size of data word in bits.
:SIZE?		Queries data word size.
:UPPer v1,v2		Sets Upper Limit to value defined as v1 EXP - v2. Range of v1 is 0 to 999. Range of v2 is 3 to 6.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
BER		
:UPPer?		Queries Upper Limit values.

DECODER COMMANDS

DECode		
:FORMat	EEA	Set DECode format for desired decode format.
	EIA	
	ZVEI	
	DZVei	
	DDZVei	
	CCIR	
	CCIRH	
	CCIRH4	
	NATel	
	EURo	
	TONE5_6	
	USER	
	DTMF	
	DCS	
	DCSINVerted	
	POCSag	
	POCInv	
:POCSag		
:BAUD v	512, 1200, 2400	Sets POCSAG receive baud rate.
:BAUD?		Queries POCSAG receive baud rate.
:BAUD		
:AUTO		Sets the POCSAG receive baud rate to Auto baud rate detect (1200 or 2400).
:MESSage?		Queries ASCII decode string. DCS and DCSINV are returned in SCPI #Q Octal format.

DISPLAY COMMANDS

The DISPlay subsystem changes the screen. Fields on the current display are updated as they are changed. New screens are displayed with this command.

DISPlay?		Queries current screen number.
DISPlay		
:ANALyzer		Displays independent Spectrum Analyzer.
:BER		Displays BER Meter.
:DUPLex		
:GENerator		No parameter for GEN screen.
	DISTortion	Displays dependent Distortion Meter.
	AFLevel	Displays AF Level Meter.
	SINad	Displays dependent SINAD Meter.
	SCOPe	Displays dependent Oscilloscope.
	ANALyzer	Displays dependent Analyzer.
:RECeiver		Displays Duplex Receive Operation Screen when no parameter is used.
	LEVel	Displays dependent Received Level Meter.
	MODulation	Displays Modulation Meter if demod is AM, Deviation Meter if demod is FM, Phase Meter if demod is PM.
	DISTortion	Displays dependent Distortion Meter.
	AFCounter	Displays dependent AF Counter.
	POWer	Displays RF Power Meter.
	SINad	Displays dependent SINAD Meter.
	SCOPe	Displays dependent Oscilloscope.
	ANALyzer	Displays dependent Spectrum Analyzer.
	RFERror	Displays RF Error Meter.
:RECGen		Displays Duplex Screen.

DISPlay		
:FGENerator		Displays Audio/Data/Signal Generators
:GENerator		Displays RF Generate Operation Screen when no parameter is used.
	DISTortion	Displays dependent Distortion Meter.
	AFLevel	Displays AF Level Meter.
	SINad	Displays dependent SINAD Meter.
	SCOPe	Displays dependent Oscilloscope.
	ANALyzer	Displays dependent Analyzer.
:METers	DISTortion	Displays Independant Distortion Meter.
	SINad	Displays Independant SINAD Meter.
	AFCounter	Displays Independant AF Counter.
	DVM	Displays Independant DVM.
:RECeiver		Displays RF Receive Operation Screen when no parameter is used.
	LEVel	Displays dependent Received Level Meter.
	MODulation	Displays Modulation Meter same as Duplex Receiver.
	DISTortion	Displays dependent Distortion Meter.
	AFCounter	Displays dependent AF Counter.
	POWer	Displays RF Powe Meter.
	SINad	Displays dependent SINAD Meter.
	SCOPe	Displays dependent Oscilloscope.
	ANALyzer	Displays dependent Spectrum Analyzer.
	RFERror	Displays RF Error Meter.
:SCOPe		Displays independent Oscilloscope.
:SETup		Displays Setup Menu.
:TRUNKing	RADIOSimulation	Displays LTR Radio Simulator Screen.
	REPeater	Displays LTR Repeater Simulator Screen.
	AUXSetup	Displays LTR Auxiliary Setup Screen,

DUPLEX COMMANDS

DUPLex		
:LOCK b	0 or 1	Sets Offset Lock to OFF and ON.
:LOCK?		Queries Offset Lock state.
:OFFSet v[units]	.2500 to 1000.0000	Sets offset frequency. Assumed units are MHz. Valid units are Hz, kHz, MHz or GHz.
:RECAll v	0 to 49	Restores duplex screen values from specified storage location.
:STORe v	0 to 49	Stores current settings at specified location.
:LABel v,string	0 to 49	Attaches character string (0 to 8 characters) to specified storage location.
:LABel? v	0 to 49	Queries LABel for specified storage location.

FILTER COMMANDS

FILTer		
:SPEaker OFF		Sets Speaker Operation to OFF.
:BANDwidth		
:CMESsage		Sets Filter to C-Message Weighted Filter.
:WIDE		Sets Filter to Wideband.
:AUDio		Sets Internal Modulation as Speaker source. Valid only on Generate and Receive Operation Screens.
:SPEaker?		Queries current Speaker setting.
:MODMeter		
:HPASs v[units]	0, 300, 4000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.

FILTer		
:MODMeter		
:HPASs?		Queries Filter setting.
:BPASs	OFF	Sets Filter to OFF.
	CMESsage	Sets Filter to C-Message Weighted Filter.
:BPASs?		Queries Filter setting.
:LPASs v[units]	0, 300, 4000, 20000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:LPASs?		Queries Filter setting.
:AFDecode		
:HPASs v[units]	0, 300, 4000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:HPASs?		Queries Filter setting.
:BPASs	OFF	Sets Filter to OFF.
	CMESsage	Sets Filter to C-Message Weighted Filter.
:BPASs?		Queries Filter setting.
:LPASs v[units]	0, 300, 4000, 20000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:LPASs?		Queries Filter setting.
:AFCounter		
:HPASs v[units]	0, 300, 4000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:HPASs?		Queries Filter setting.
:BPASs	OFF	Sets Filter to OFF.
	CMESsage	Sets Filter to C-Message Weighted Filter.
:BPASs?		Queries Filter setting.
:LPASs v[units]	0, 300, 4000, 20000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:LPASs?		Queries Filter setting.
:DATADecode		
:HPASs v[units]	0, 300, 4000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:HPASs?		Queries Filter setting.
:BPASs	OFF	Sets Filter to OFF.
	CMESsage	Sets Filter to C-Message Weighted Filter.
:BPASs?		Queries Filter setting.
:LPASs v[units]	0, 300, 4000, 20000	Sets Filter to specified value. Default units are Hz. Accepted units are Hz and kHz. Setting filter to 0 sets filter OFF.
:LPASs?		Queries Filter setting.
:CLEar		Sets all filters to OFF. Does not affect speaker.

FORMAT COMMANDS

The format commands set data formats for transferring numeric information. The data format for response data may override the definition of FORMat.

EXAMPLE: Floating point requirements always override a non-base10 FORMat.

FORMat type	
ASCii	Returns all data (including integers and real numbers) as an ASCII representation. Numbers are returned in base 10.
BINary	Returns data encoded as numeric base 2, preceded by #B. Example: 15 is #B1111.
HEXadecimal	Returns data encoded as numeric base 16, preceded by #H. Example: 255 is #HFF.
INTeger	Returns ONLY block data encoded as 8 bit binary data with header and checksum.
OCTal	Returns data encoded as numeric base 8, preceded by #Q. Example: 255 is #Q377.

FUNCTION GENERATOR COMMANDS

FGENerator		
:ATTenuation b	0 or 1	Turning Attenuation on activates divide-by-100 attenuator.
:ATTenuation?		Queries Attenuation state.
:DATA		
:CODe v	#Q0 to #Q777	Sets octal Code Value for DCS/ (DCS Inverted).
:CODe?		Queries DCS/DCS Inverted octal Code Value.
:FORMat	DCS	Sets DATA Format to DCS.
	INVDCS	Sets DATA Format to DCS Inverted.
	INVPOC	Sets DATA Format to POCSAG Inverted.
	POCSag	Sets DATA Format to POCSAG.
:FORMat?		Queries DATA Format.
:LEVel v		Sets output level for DATA Generator. Value is dependent on status of Attenuation. Value is 0 to 2.5 Vp if OFF and 0 to .250 Vp if ON.
:LEVel?		Queries DATA Generator LEVel.
:POCSag		
:BAUD v	512, 1200, 2400	Selects Baud rate for POCSAG Generation.
:BAUD?		Queries POCSAG Baud rate.
:CAPCode v1[,v2]	0 to 9999999	Sets capcode range. v1 corresponds to start value and v2 corresponds to end value. Start value must be ≤ end value.
:CAPCode?		Queries current pocsag capcode.
:ENCode		Activates POGSAG Generation.
:MODE	BEEP1	Sets POCSAG Mode to 1 Beep.
	BEEP2	Sets POCSAG Mode to 2 Beep.
	BEEP3	Sets POCSAG Mode to 3 Beep.
	BEEP4	Sets POCSAG Mode to 4 Beep.
	NUMeric	Sets POCSAG Mode to Numeric.
	NUMSeq	Sets POCSAG Mode to Numeric Sequence.
	ANUM	Sets POCSAG Mode to Alpha-Numeric.

FGENerator		
:DATA		
:POCSag		
:MODE	ANUM_LC	Sets POCSAG Mode to Alpha-Numeric lower case.
	ANUM_UC	Sets POCSAG Mode to Alpha-Numeric upper case.
	ANUM_SPec	Sets POCSAG Mode to Alpha-Numeric special characters.
:MODE?		Queries POCSAG Mode.
:STATe b	0 or 1	Sets DATA Generator to ON or OFF.
:STATe?		Queries DATA Generator status.
:DTMF		
:CODe string		Sets DTMF Code where string is code.
:CODe?		Queries DTMF Code.
:ENCode		Starts DTMF burst message.
:LEVel v		Sets output level for DTMF Generator. Value is dependent on status of Attenuation. Value is 0 to 2.5 Vp if OFF and 0 to .250 Vp if ON.
:LEVel?		Queries DTMF Generator LEVel.
:MARK v	25 to 999	Sets Mark Time in ms.
:MARK?		Queries Mark Time.
:MODE	CONTinuous	Sets operation to continuous generation.
	BURSt	Sets operation to single burst.
:MODE?		Returns operation mode.
:PAUSe v	25 to 999	Sets Pause Time in ms.
:PAUSe?		Queries Pause Time.
:SPACe v	25 to 999	Sets Space Time in ms.
:SPACe?		Queries Space Time.
:STATe b	0 or 1	Sets DTMF Generator to ON or OFF.
:STATe?		Queries DTMF Generator status.
:GEN1		
:ENCode		Issues burst message of current format.
:FORMat		
:EEA string	0-9, A, G, R	Sets EEA Format with Code set to string.
:EIA string	0-9, A, G, R	Sets EIA Format with Code set to string.
:ZVEI string	0-9, A, G, R	Sets ZVEI Format with Code set to string.
:DZVei string	0-9, A, G, R	Sets DZVEI Format with Code set to string.
:DDZVei string	0-9, A, G, R	Sets DDZVEI Format with Code set to string.
:CCIR string	0-9, A, G, R	Sets CCIR Format with Code set to string.
:CCIRH string	0-9, A, G, R	Sets CCIRH Format with Code set to string.
:CCIRH4 string	0-9, A, G, R	Sets CCIRH4 Format with Code set to string.
:NATel string	0-9, A, G, R	Sets NATEL Format with Code set to string.
:EURo string	0-9, A, G, R	Sets EURO Format with Code set to string.
:TONE5_6 string	0-9, A, G, R	Sets 5/6 TONE Format with Code set to string.
:USER string	0-9, A-T	Sets USER Format with Code set to string.
:TONE10ps string	0-9, A-D, #, *	Sets 10 PS Format with Code set to string.
:TONE20ps string	0-9, A-D, #, *	Sets 10 PS Format with Code set to string.
:MTS string	0-9, A-D, #, *	Sets MTS Format with Code set to string.
:IMTS string	0-9, A-D, #, *	Sets IMTS Format with Code set to string.
:TREM		Sets Tone Remote Format.
:TONe		Sets Tone Format.
:FORMat?		Queries current GEN1 format.
:FREQuency v		Sets GEN1 Frequency. Range of value is 5.0 to 20000.0 Hz for Sine Shape and Tone Format. 5.0 to 10000.0 Hz for other shapes and Tone Format. Selections for Tone remote are: 1950, 1850, 1350,1250, 2050, 1750, 1650,1550, 1450, 1150, or 1050 Hz.
:FREQuency?		Queries GEN1 frequency.
:LEVel v		Sets output level for Audio Generator 1. Value is dependent on status of Attenuation.

FGENerator		
:GEN1		
:LEVel?		Queries Audio Generator 1 LEVel. 0 to 2.5 Vp if OFF and 0 to .250 Vp if ON.
:MODE	CONTinuous	Sets mode for continous operation.
	BURSt	Initiates a burst of current format.
:MODE?		Queries mode.
:STATe b	0 or 1	Sets Audio Generator 1 to ON or OFF.
:STATe?		Queries Audio Generator 1 status.
:SHAPe	SINe	Sets Shape to Sine.
	SQUare	Sets Shape to Square.
	RAMP	Sets Shape to Ramp.
	TRIangle	Sets Shape to Triangle.
:SHAPe?		Queries Shape.
:TIMe v	0 to 32.000	Sets burst time for Tone format in seconds.
:TIMe?		Queries Tone burst time.
:USER "char",v1,v2		Sets User Codes. "char" is 0 to 9 or A to T enclosed in quotes. Code frequency (v1) is 0.0 to 9999 Hz. Duration (v2) is 0.000 to 9.999 seconds.
:USER? "char"		Returns frequency and duration of specified code.
:GEN2		
:FREQuency v		Sets GEN2 Frequency. Range of value is 5.0 to 20000.0 Hz for Sine Shape and 5.0 to 10000.0 Hz for other shapes. Requires Option 04 for frequency other than 1000.0 Hz.
:FREQuency?		Queries Frequency.
:LEVel v		Sets output level for Audio Generator 2. Value is dependent on status of Attenuation. Value is 0 to 2.5 Vp if OFF and 0 to .250 Vp if ON.
:LEVel?		Queries Audio Generator 2 LEVel.
:SHAPe	SINe	Sets Shape to Sine.
	SQUare	Sets Shape to Square. Requires Option 04.
	RAMP	Sets Shape to Ramp. Requires Option 04.
	TRIangle	Sets Shape to Triangle. Requires Option 04.
:SHAPe?		Queries Shape.
:STATe b	0 or 1	Sets Audio Generator 2 to ON or OFF.
:STATe?		Queries Audio Generator 2 status.

GENERATOR COMMANDS

NOTE1: Set frequency to value. Assumed units are MHz. Valid optional units are Hz, kHz, MHz or GHz. Frequency range is from 0.0 to 1000.0000 MHz.

NOTE2: Set output level in DBM, uV, mV or V. Assumed units are dBm. Ranges are as follows:

UNITS	T/R	AUX w/o 20dB AMP	AUX w/20dBm AMP
DBM	-130 to -20	-130 to -13	-130 to 13
uV	0 to 999.9	0 to 999.9	0 to 999.9

UNITS	T/R	AUX w/o 20dB AMP	AUX w/20dBm AMP
mV	0 to 22.3	0 to 50.5	0 to 999.9
V	0 to 0.022	0 to 0.050	0 to 0.988

NOTE3: Cannot have FM and PM modulation chosen on two different function generator devices.

NOTE4: Must set the "MODE" before using this command.

GENerator		
:FREQuency v[units]	0.0 to 1000.0000	See NOTE 1.
:CELLular v	1 to 1023	Sets Cellular channel. See NOTE 4.
:CELLular?		Queries current Cellular channel.
:LIST v	0 to 99	Sets frequency list value. Refer to NOTE 4.
:FREQuency v1,v2[units]	0 to 99, 0.0 to 1000.0000	Sets frequency list value (v1) to frequency (v2). See NOTE 1.
:FREQuency? v	0 to 99	Queries frequency of specified frequency list value.
:LABel v,string	0 to 99	Attaches character string (®6 characters) to specified frequency list value.
:LABel? v	0 to 99	Queries LABel for specified frequency list value.
:LIST?		Queries frequency list value.
:MODE		
:CELLular	FORward	Sets cellular forward channel as MODE Type.
	REVerse	Sets cellular reverse channel as MODE Type.
:FIXed		Sets frequency as MODE Type.
:LIST		Sets Frequency LIST as MODE Type.
:TRUNKing	FORward	Sets trunking forward channel as MODE Type.
	REVerse	Sets trunking reverse channel as MODE Type.
:MODE?		Returns current MODE.
:TRUNKing v1,v2	1 to 760, 800 or 900	Sets Trunking Channel in specified band. See NOTE 4.
:TRUNKing?		Queries Trunking Channel.
:FREQuency?		Returns frequency in MHz.
:METer		
:ANALyzer		Sets Spectrum Analyzer on RF Generate Operation Screen.
:DISTortion		Sets Distortion Meter on RF Generate Operation Screen.
:SCOPe		Sets Oscilloscope on RF Generate Operation Screen.

GENerator		
:METer		
:SINad		Sets SINAD Meter on RF Generate Operation Screen.
:OUTPut		
:AUX		Sets AUX RF OUT Connector as output.
:DATA		
:AM		
[:MODulation]	0% to 100%	Sets AM Modulation Level.
[:MODulation]?		Queries AM Modulation Level.
:FM		
[:DEViation] v	0.0 to 100.0	Sets FM Deviation in kHz.
[:DEViation]?		Queries FM Deviation.
:MODulation	AM	Sets Modulation Type to AM.
	FM	Sets Modulation Type to FM. See NOTE 3.
	OFF	Sets Modulation Type to OFF.
	PM	Sets Modulation Type to PM. See NOTE 3.
:MODulation?		Queries Modulation Type.
:PM		
[:DEViation] v	0.0 to 10.0	Sets PM Deviation in Radians.
: [:DEViation]?		Queries PM Deviation.
:DTMF		
:AM		
[:MODulation]	0% to 100%	Sets AM Modulation Level.
[:MODulation]?		Queries AM Modulation Level.
:FM		
[:DEViation] v	0.0 to 100.0	Sets FM Deviation in kHz.
[:DEViation]?		Queries FM Deviation.
:MODulation	AM	Sets Modulation Type to AM.
	FM	Sets Modulation Type to FM. See NOTE 3.
	OFF	Sets Modulation Type to OFF.
	PM	Sets Modulation Type to PM. See NOTE 3.
:MODulation?		Queries Modulation Type.
:PM		
[:DEViation] v	0.0 to 10.0	Sets PM Deviation in Radians.
: [:DEViation]?		Queries PM Deviation.
:EXTernal		
:MODulation	AM	Sets Modulation Type to AM.
	FMNARR1	Sets Modulation Type to FM NAR 1. See NOTE 3.
	FMNARR2	Sets Modulation Type to FM NAR 2. See NOTE 3.
	FMNARR3	Sets Modulation Type to FM NAR 3. See NOTE 3.
	FMWIDE	Sets Modulation Type to FM WIDE. See NOTE 3.
	OFF	Sets Modulation Type to OFF.
	PMNARR1	Sets Modulation Type to PM NAR 1. See NOTE 3.
	PMNARR2	Sets Modulation Tyoe to PM NAR 2. See NOTE 3.
	PMNARR3	Sets Modulation Type to PM NAR 3. See NOTE 3.
:MODulation?		Queries Modulation Type.
:GATE	TR	Sets T/R Connector as output connector, as selected by MIC PTT switch.
	AUX	Sets AUX RF OUT Connector as output, as selected by MIC PTT switch.
:GEN1		
:AM		
[:MODulation]	0% to 100%	Sets AM Modulation Level.
[:MODulation]?		Queries AM Modulation Level.
:FM		
[:DEViation] v	0.0 to 100.0	Sets FM Deviation in kHz.
[:DEViation]?		Queries FM Deviation.

GENerator		
:OUTPut		
:GEN1		
:MODulation	AM	Sets Modulation Type to AM.
	FM	Sets Modulation Type to FM. See NOTE 3.
	OFF	Sets Modulation Type to OFF.
	PM	Sets Modulation Type to PM. See NOTE 3.
:MODulation?		Queries Modulation Type.
:PM		
[:DEViation] v	0.0 to 10.0	Sets PM Deviation in Radians.
: [:DEViation]?		Queries PM Deviation.
:GEN2		
:AM		
[:MODulation]	0% to 100%	Sets AM Modulation Level.
[:MODulation]?		Queries AM Modulation Level.
:FM		
[:DEViation] v	0.0 to 100.0	Sets FM Deviation in kHz.
[:DEViation]?		Queries FM Deviation.
:MODulation	AM	Sets Modulation Type to AM.
	FM	Sets Modulation Type to FM. See NOTE 3.
	OFF	Sets Modulation Type to OFF.
	PM	Sets Modulation Type to PM. See NOTE 3.
:MODulation?		Queries Modulation Type.
:PM		
[:DEViation] v	0.0 to 10.0	Sets PM Deviation in Radians.
: [:DEViation]?		Queries PM Deviation.
:LEVel v[units]		Sets Output level. See NOTE 2.
:LEVel?		Queries Output level.
:LEVel		
:UNITs	DBM	Sets UNITS for LEVel? command to dBm.
	UV	Sets UNITS for LEVel? command to µV.
	MV	Sets UNITS for LEVel? command to mV.
	V	Sets UNITS for LEVel? command to V.
:UNITs?		Queries UNITS Type.
:MIC		
:MODulation	AM	Sets Modulation Type to AM.
	FMNARR1	Sets Modulation Type to FM NAR 1. See NOTE 3.
	FMNARR2	Sets Modulation Type to FM NAR 2. See NOTE 3.
	FMNARR3	Sets Modulation Type to FM NAR 3. See NOTE 3.
	FMWIDE	Sets Modulation Type to FM WIDE. See NOTE 3.
	OFF	Sets Modulation Type to OFF.
	PMNARR1	Sets Modulation Type to PM NAR 1. See NOTE 3.
	PMNARR2	Sets Modulation Tyoe to PM NAR 2. See NOTE 3.
	PMNARR3	Sets Modulation Type to PM NAR 3. See NOTE 3.
:MODulation?		Queries Modulation Type.
:TR		Sets T/R Connector as output connector.
:OUTPut?		Queries selected output connector.
:RECAll v	0 to 49	Restore GENERATE Screen values from specified location.
:STORe v	0 to 49	Stores current screen locations at specified location.
:LABel v,string	0 to 49	Attaches character string (0 to 8 characters) to specified storage location.
:LABel? v	0 to 49	Queries LABel for storage location.

GENerator		
:SWEep		
:ABORt		Stops Sweep Function.
:CONTinuous		Sets Sweep Function to Continuous Operation. Use ABORt to halt.
:INCRement v	0.0001 to 1000.0000	Sets Increment Frequency in MHz.
:INCRement?		Queries Increment Frequency.
:PAUSe v	0.0 to 9.5	Sets Pause time for Sweep Function in 0.5 second increments.
:PAUSe?		Queries Pause time for Sweep Function.
:ONCE		Sets Sweep Function for one pass. Use ABORt after pass.
:STARt v	0.0 to 1000.0000	Sets Start RF in MHz.
:STARt?		Queries Start RF.
:STOP v	0.0 to 1000.0000	Sets Stop RF in MHz.
:STOP?		Queries Stop RF.
:RESUme		Continue sweeping where stopped or continue sweeping if in squelch mode.
:FREQuency?		Return current Sweep Function frequency in MHz.
:SWEep?		Queries Sweep Function Status. Returns 0 if off.

MEASURING COMMANDS

MEASure	Commands require specified meter be active.
:SINad?	Queries SINAD Meter reading.
:FM	
:NEG?	Returns the Negative peak FM Deviation Meter reading.
:POS?	Returns the Positive peak FM Deviation Meter reading.
:FM?	Returns +/- peak div by 2 FM Deviation Meter reading.
:PM	
:NEG?	Returns the Negative peak FM Deviation Meter reading.
:POS?	Returns the Positive peak FM Deviation Meter reading.
:PM?	Queries PM Deviation Meter reading.
:AM?	Queries AM Modulation Meter reading.
:RECLevel?	Queries Received Level Meter reading.
:AFCounter?	Queries AF Counter reading. Return value resolution is .1 Hz if input frequency is <500 Hz or gatetime is 10 sec. Otherwise resolution is 1 Hz.
:POWer?	Queries Power Meter reading.
:DVM?	Queries DVM reading.
:DISTortion?	Queries Distortion Meter reading.
:RFERror?	Queries RF ERROR Meter reading and input frequency. Resolution is 1 Hz if gatetime is 1 sec. Otherwise, resolution is 10 Hz.
:AFLevel?	Queries AF Level Meter reading.
:BER?	Initiates BER Meter, then queries BER Meter reading. BER Meter reading as string consists of mantissa, "EXP" and exponent.
INITiate	Initiates measurement of slow meters. SRQ indicates completion, if SRQ mask for meter is enabled.
:AFCounter	Starts AF Counter Measurement.
:RFERror	Starts RF Error Meter Measurement.
:BER	Starts BER Meter Measurement.
:TRUNKing	Starts next trunking decode.

FETCh		Returns value(s) created by INIT command, or error code -230.
:AFCounter?		Queries AF Counter reading.
:RFERror?		Queries RF ERROR Meter reading and input frequency. Resolution is 1 Hz if gatetime is 1 sec. Otherwise, resolution is 10 Hz.
:BER?		Queries BER Meter reading. BER Meter reading as string consists of mantissa, "EXP" and exponent.
:TRUNKing?		Returns decoded trunking data.

METER COMMANDS

METer		
:SINad		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:INPut	AUDIN	Sets input to AUDIO/DATA IN Connector.
	SCOPedvm	Sets Input to SCOP/DVM Connector.
:SINad		
:INPut?		Queries Input setting.
:LOWer v	0.0 to 40.0	Sets Lower Limit values in dB.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	15 or 40	Sets display range in dB.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UPPer v	0.0 to 40.0	Sets Upper Limit value in dB.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:FM		
[:DEViation]		
:ADJust		Performs FM-Z.
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:COUPLing	AC	Set Meter for AC Coupled operation.
	DC	Set Meter for DC Coupled operation.
:COUPLing?		

METer		
:FM		
[:DEViation]		
:LOWer v	0.0 to 99.99	Sets Lower Limit values in kHz.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	2, 5, 10, 50, 100	Sets display range in kHz. Hz are also acceptable units.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UPPer v	0.0 to 99.99	Sets Upper Limit value in kHz.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
[:MODE]		
:NORMal		Reads Deviation +/- peak div by 2.
:BOTH		Reads Positive and Negative Deviation.
[:MODE?]		Returns Deviation Meter Mode.
:PM		
[:DEViation]		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:LOWer v	0.0 to 9.99	Sets Lower Limit values in Radians.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	1, 2, 5, 10	Sets display range in Radians.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UPPer v	0.0 to 9.99	Sets Upper Limit value in Radians.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
[:MODE]		
:NORMal		Reads Deviation +/- peak div by 2.
:BOTH		Reads Positive and Negative Deviation.
[:MODE?]		Returns Deviation Meter Mode.
:AM		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.

METer		
:AM		
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:LOWer v	0.0% to 99.9%	Sets Lower Limit values.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
LOWer v	0.0% to 99.9%	Sets Lower Limit values.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:AM		
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	40% or 100%	Sets display range.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UPPer v	0.0% to 99.9%	Sets Upper Limit value.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:RECLevel		
:ADJust		Performs runtime adjustment. Requires external connection between ANTENNA Connector and T/R Connector for valid adjustment.
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 75	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:RECLevel		
:LOWer v		Sets Lower Limit values. Range of value is dependent on Receiver Attenuation and Units. If REC:INP:ATT is set to 30 dB, range is -80 to 0 dBm or 22.3 to 223606 µV. If REC:INP:ATT is set to 0 dB, range is -110 to -30 dBm or 0 to 70710 µV.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:UNITs	DBM	Sets units for meter to dBm.
	UV	Sets units for meter to µV.
:UNITs?		Return the units.

METer		
:AFCounter		
:ALARm		
:UPPer v		Sets Upper Limit values. Range of value is dependent on Receiver Attenuation and Units. If REC:INP:ATT is set to 30 dB, range is -80 to 0 dBm or 22.3 to 223606 µV. If REC:INP:ATT is set to 0 dB, range is -110 to -30 dBm or 0 to 70710 µV.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:GATE		
:TIME v	1 or 10	Sets Gate Time in seconds.
:TIME?		Queries Gate Time.
:INPut	AUDIN	Sets AF Counter Input to AUDIO/DATA IN Connector.
	RFPower	Sets AF Counter Input to RF Power line.
	EXTMod	Sets AF Counter Input to EXT MOD Connector.
	SCOPedvm	Sets AF Counter Input to SCOPE/DVM Connector.
:INPut?		Queries meter Input.
:LOWer v	0.0 to 20000.0	Sets Lower Limit values in Hz.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:AFCounter		
:RANGe v[units]	200, 2000, 20000	Sets display range. Assumed units are Hz, If kHz is specified, values are 0.2, 2 and 20.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UPPer v	0.0 to 20000.0	Sets Upper Limit value in Hz.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:AFLevel		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:IMPedance v	0 to 1000	Specify input impedance of user signal.
:IMPedance?		Queries impedance.
:LOWer v	0.00 to 10.00	Sets Lower Limit values in V.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.

METer		
:AFLevel		
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	.05, .1, .2, .5, 1, 2, 5, 10	Sets display range. Assumed units are V, allowed units are mV and V.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UNITs	DBM	Sets units for meter to dBm.
	VRMS	Sets units for meter to Vrms.
	DB	Sets units for meter to dB.
:UNITs?		Queries units setting.
:UPPer v	0.00 to 10.00	Sets Upper Limit value in V.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:POWer		
:ADJust		Zeroes Power Meter. Requires Power applied to T/R Connector be removed.
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 75	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:LOSS v	-9.9 to 9.9	Sets Cable Loss in dB.
:LOSS?		Queries Cable Loss value.
:LOWer v	0.0000 to 200.0000	Sets Lower Limit values in W.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:POWer		
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	.002, .005, .01, .02, .05, .1, .2, .5, 1, 2, 5, 10, 20, 50, 100,200	Sets display range. Assumed units are W, allowed units are mW and W.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UNITs	DBM	Sets units for meter to dBm.
	W	Sets units for meter to W.
:UNITs?		Queries units setting.
:UPPer v	0.0000 to 200.0000	Sets Upper Limit value in W.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:DVM		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.

METer		
:DVM		
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:IMPedance v	2 to 1000	Specifies input impedance of user signal.
:IMPedance?		Queries impedance.
:INPut	AC	Sets meter input to ac coupled SCOPE/DVM
:INPut?		Queries DVM Meter input.
		Connector.
	AUDIN	Sets meter input to AUDIO/DATA IN Connector.
	DC	Sets meter input to dc coupled SCOPE/DVM Connector.
	EXTMod	Sets meter input to EXT MOD Connector.
	GROund	Sets meter input to GND coupled SCOPE/DVM Connector.
:LOWer v	0.000 to 200.000	Sets Lower Limit values in V.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	.05, .1, .2, .5, 1, 2	Sets display range. Assumed units are V,
	5, 10, 20, 50, 100, 200	allowed units are mV and V.
:RANGe?		Queries Range.
:UNITs	DBM	Sets units for meter to dBm.
	VRMS	Sets units for meter to Vrms.
	DB	Sets units for meter to dB.
:UNITs?		Queries units setting.
:UPPer v	0.000 to 200.000	Sets Upper Limit value in V.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:DISTortion		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:INPut	AUDIN	Sets meter input to AUDIO/DATA IN Connector.
:INPut?	SCOPedvm	Sets meter input to SCOPE/DVM Connector.
		Queries Distortion Meter input.
:LOWer v	0.0% to 20.0%	Sets Lower Limit values.
:STATe b	0 or 1	Sets Lower Limit to ON or OFF.
:STATe?		Queries Lower Limit state.
:LOWer?		Queries Lower Limit value.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.

METer		
:DISTortion		
:UPPer v	0.0% to 20.0%	Sets Upper Limit value.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.
:RFERror		
:ALARm		
:STATe b	0 or 1	Sets Alarm to ON or OFF.
:STATe?		Queries Alarm state.
:AVERage		
:COUNt v	2 to 10	Sets number of Average samples when active.
:COUNt?		Queries number of Average samples.
:STATeb	0 or 1	Sets Average to ON or OFF.
:STATe?		Queries Average state.
:GATE		
:TIME v	0.1 or 1.0	Sets Gate Time in seconds.
:TIME?		Queries Gate Time.
:PEAKhold		
:MINimum?		Queries minimum peak value.
:MAXimum?		Queries maximum peak value.
:RESet		Resets Peak Hold setting.
:STATe b	0 or 1	Sets Peak Hold to ON or OFF.
:STATe?		Queries Peak Hold setting.
:RANGe v[units]	.1, 1, 10, 100	Sets display range. Assumed units are kHz, allowed units are Hz and kHz.
:AUTO		Sets display range to autorange.
:RANGe?		Queries Range.
:UPPer v	0.0 to 100000.0	Sets Upper Limit value in Hz.
:STATe b	0 or 1	Sets Upper Limit to ON or OFF.
:STATe?		Queries Upper Limit state.
:UPPer?		Queries Upper Limit value.

RECEIVER COMMANDS

NOTE1: Set frequency to value. Assumed units are MHz. Valid optional units are Hz, kHz, MHz or GHz. Accepted frequency range is from 0.0000 through 1000.0000 MHz in 0.1 kHz steps.

NOTE2: Must set the "MODE" before using this command.

RECeiver		
:BANDwidth v[units]	3, 15, 30, 300	Sets Receiver IF Bandwidth in kHz. 3 kHz requires Option 8. 30 kHz requires Option 3.
:BANDwidth?		Queries IF Bandwidth.
:DEMODulation	AM	Sets Demodulation to AM.
	FM	Sets Demodulation to FM.
	LB	Sets Demodulation to Lower SSB. Requires Option 8.
	PM	Sets Demodulation to PM.
	UB	Sets Demodulation to Upper SSB. Requires Option 8.
:DEMODulation?		Queries Demodulation type.
:FREQuency v[units]	0.0000 to 1000.0000	See NOTE 1.
:CELLular v	1 to 1023	Sets Cellular channel. See NOTE 2.
:CELLular?		Queries current Cellular channel.
:LIST v	0 to 99	Sets frequency list value. See NOTE 2.
:FREQuency v1,v2[units]	0 to 99, 0.0000 to 1000.0000	Sets frequency list value (v1) to frequency (v2). See NOTE 1.
:FREQuency? v	0 to 99	Queries frequency of specified frequency list value.
:LABel v,string	0 to 99	Attaches character string (®6 characters) to specified frequency list value.
:LABel? v	0 to 99	Queries LABel for specified frequency list value.
:LIST?		Queries frequency list value.
:MODE		
:CELLular	FORward	Sets cellular forward channel as MODE Type.
	REVerse	Sets cellular reverse channel as MODE Type.
:FIXed		Sets frequency as MODE Type.
:LIST		Sets Frequency LIST as MODE Type.
:TRUNKing	FORward	Sets trunking forward channel as MODE Type.
	REVerse	Sets trunking reverse channel as MODE Type.
:MODE?		Returns current MODE.
:TRUNKing v1,v2	1 to 760, 800 or 900	Sets Trunking Channel in specified band. See NOTE 2.
:TRUNKing?		Queries Trunking Channel.
:FREQuency?		Returns frequency in MHz.
:INPut		
:ANTenna		Selects Antenna input connector.
:ATTenuation v	0, 30	Sets input ATTenuation in dB.
:ATTenuation?		Returns input ATTenuation in dB.
:TR		Selects TR input connector.
:INPut?		Returns selected input connector.
[:METer]		
:ANALyzer		Sets Spectrum Analyzer on RF Receive Operation Screen.
:DEViation		Sets appropriate Modulation/Deviation Meter on RF Receive Operation Screen.
:DISTortion		Sets Distortion Meter on RF Receive Operation Screen.

SCOPe		
:MODE	AVERage	Sets Mode to Average.
	COMPare	Sets Mode to Compare.
	LIVE	Sets Mode to LIVE.
	RECAll	Recalls stored trace.
	STORe	Stores current trace in memory.
:MODE?		Queries Mode Type.
:SCALe v[units]		Sets Vertical Scale. Default units are V. Valid units are V and mV. Values include; 10, 20, 50, 100, 200, 500 mV, 1, 2, 5, 10, 20 and 50 V.
:SCALe?		Returns vertical scale with units.
:SWEep[:TIME] v[units]		Sets duration of sweep per division. Assumed units are ms. Valid units are µs (US) and ms (MS). Accepted values are 100, 200, 500 µs, 1, 2, 5, 10, 20, 50 and 100 ms.
:SWEep[:TIME]?		Returns SWEep setting with units.
:TRACe		
:DATA?[v1,v2,v3]		Queries current data trace values. v1 specifies Mode (0[live], 1[recall]). v2 specifies start point in pixels, with range of 0 to 499. v3 specifies number of returned points in pixels with range of 0 to 499, where v1 + v2 ®500. Defaults are 0,0,500.
:TRIGger		
:ARM		Arms Trigger for Singleshot Mode.
:LEVel v	0 to 255	Sets trigger level.
:LEVel?		Queries trigger level.
:MODE	AUTO	Sets Trigger Mode to automatic.
	SINGleshot	Sets Trigger Mode to Singleshot.
	NORMal	Sets Trigger Mode to Normaiized.
:MODE?		Queries Trigger Mode setting.

STATUS COMMANDS

See Status Bit definitions and SCPI manuals for further descriptions.

STATus	
:OPERation	
:CONDition?	Returns operation condition register.
:ENABle v	Sets enable mask in event register.
:ENABle?	Returns state of event register's enable bit.
:EVENt?	Returns, then clears operation's event register.
:INSTrument	
:CONDition?	Queries Operation complete status-1.
:EBIT	Sets extension bits.
:CONDition?	Returns operation complete status-2.
:ENABle v	Sets enable mask in INST EBIT EVENt register.
:ENABle?	Queries enable mask in INST EBIT EVENt register.
:EVENt?	Queries INSTrument EBIT EVENt register.
:ENABle v	Sets enable mask in INSTrument EVENt register.
:ENABle?	Queries enable mask in INSTrument EVENt register.
:EVENt?	Queries INSTrument EVENt register.
:MEASuring	
:CONDition?	Returns operation measuring status-1.

```
STATus
   :OPERation
      :MEASuring
         :EBIT
            :CONDition?                    Returns operation measuring status-2.
            :ENABle v                      Set enable mask in MEAS EBIT EVENt register.
      :MEASuring
            :ENABle?                       Queries enable mask in MEAS EBIT EVENt
                                              register.
            :EVENt?                        Queries MEAS EBIT EVENt register.
         :ENABle v                         Sets enable mask in MEAS EVENt register.
         :ENABle?                          Queries enable mask in MEAS EVENt register.
         :EVENt?                           Queries MEAS EVENt register.
   :PRESet                                 Initializes enable and transition filter registers
                                              for SCPI mandated data structures.

   :QUEStionable
      :CONDition?                          Queries QUEST CONDition register.
      :ENABle v                            Sets enable mask in QUES EVENt register.
      :ENABle?                             Queries enable mask in QUES EVENt register.
      :EVENt?                              Queries QUEST EVENt register.
      :INSTrument
         :CONDition?                       Returns questionable status-1.
         :EBIT
            :CONDition?                    Returns questionable status-2.
            :ENABle v                      Sets enable mask in QUES INST EBIT EVENt
                                              register.
            :ENABle?                       Queries enable mask in QUES INST EBIT EVENt
                                              register.
            :EVENt?                        Queries QUES INST EBIT EVENt register.
         :ENABle v                         Sets enable mask in QUES INST EVENt register.
         :ENABle?                          Queries enable mask in QUES INST EVENt
                                              register.
         :EVENt?                           Queries QUES INST EVENt register.
```

SYSTEM COMMANDS

```
SYSTem
   :ERRor?                                 Returns error code + error message.
                                              Refer to para 5-5 for codes/messages.
   :VERSion?                               Returns version of SCPI used.
   :KEY v                                  Sends keycode to execute.
                                              Refer to para 5-6 for definitions.
      :STARt                               Sends start key.
      :STOP                Sends stop key.
   :KEY?                                   Returns key pressed or -1 if none.
   :KLOCk b             0 = off, 1 = on    OFF enables front panel keyboard usage.
                                              SYST:SEC OFF must be sent before setting
                                              this command to OFF. ON disables front
                                              panel keyboard.
   :KLOCk?                                 Returns keyboard lock state.
   :COMMunicate
      :SERial
         :BAUD v        110, 150, 300, 600, Sets Baud rate.
                        1200, 2400, 4800,
                        9600, 19200, 38400
         :BAUD?                            Queries Baud rate.
         :PARity xxx    EVEN, ODD, NONE    Sets Data Parity.
         :PARity?                          Queries Parity.
         :BITS v        7 or 8             Sets Data Bits.
         :BITS?                            Queries Data Bits.
```

SYSTem		
:COMMunicate		
:SERial		
:SBITs v	1 or 2	Sets Stop Bits.
:SBITS?		Queries Stop Bits.
:PACE	XON, NONE	Sets XON/XOFF handshake control.
:PACE?		Queries XON/XOFF handshake control.
:CONTrol:		
RTS xxx	ON, STANdard, RFR	Sets hardware handshake control.
RTS?		Queries hardware handshake control.
:ECHO b	0 = off, 1 = on	Sets RCI ECHO on/off.
:ECHO?		Returns RCI ECHO state.
:GPIB		
:ADDRess v	1 to 30	Sets GPIB Address.
:DATE v,v,v		Sets numeric year, month and day.
:DATE?		Query numeric year, month and day.
:DEFault		Resets all unit settings to factory defaults.
:TIME v,v,v		Sets numeric hour, minute and second.
:TIME?		Query numeric hour, minute and second.
:SECurity		Refer to SCPI Volume 1 manual.
[:STATe] b	0 = off, 1 = on	Sets SECurity STATe.
[:STATe]?		
:SECurity?		

TRUNKING COMMANDS

These commands require Option 14, CLEARCHANNEL LTR® be installed.

TRUNKing		
:BORDer v	0 or 1	Sets Border Offset to DISABLED or ENABLED.
:BORDer?		Queries Border Offset state.
:FREEChan v	1 to 760	Sets Free Repeater channel number.
:FREEChan?		Queries Free Repeater channel number.
:RADIOSimulation		
:CHANnel v	1 to 760	Sets Channel Number for testing.
:CHANnel?		Queries Channel Number.
:BAND	800 or 900	Sets Bandwidth in MHz.
:BAND?		Queries Bandwidth.
:AREA b	0 or 1	Sets Area Bit ON or OFF.
:AREA?		Queries Area Bit setting.
:INUSe v	0 to 31	Sets Inuse Number.
:INUSe?		Queries Inuse Number.
:HOME v	0 to 31	Sets Home Repeater Number
:HOME?		Queries Home Repeater Number.
:GROUP v	0 to 255	Sets Group Number.
:GROUP?		Queries Group Number.
:FREE v	0 to 31	Sets Free Repeater Number.
:FREE?		Queries Free Repeater Number.
:ENCode		Starts Test.
:REPeater		
:MODE	FREE	Sets Mode to Free Home Repeater.
	BUSY	Sets Mode to Busy Home Repeater.
:MODE?		Queries simulation mode type.
:CHANnel v	1 to 760	Sets Channel Number for testing.
:CHANnel?		Queries Channel Number.
:BAND	800 or 900	Sets Bandwidth in MHz.
:BAND?		Queries Bandwidth.
:AREA b	0 or 1	Sets Area Bit ON or OFF.

TRUNKing		
:REPeater		
:AREA?		Queries Area Bit setting.
:GOTO v	0 to 31	Sets Goto Number.
:GOTO?		Queries Goto Number.
:HOME v	0 to 31	Sets Home Repeater Number
:HOME?		Queries Home Repeater Number.
:GROUP v	0 to 255	Sets Group Number.
:GROUP?		Queries Group Number.
:FREE v	0 to 31	Sets Free Repeater Number.
:FREE?		Queries Free Repeater Number.
:ENCode		Starts Test.
:RICGroup v	1 to 250	Sets Radio RIC ID.
:RICGroup?		Queries Radio RIC ID.
:SYNC v	#H0 TO #H1FF	Sets System Sync value.
:SYNC?		Queries System Sync value.

The **DELAY** command delays for 2 seconds to allow time for the DCS Code generation

TPAUSE
This command passes command execution to the next macro any Test Set activity in the schedule queue.

6-16 SYSTEM RS-232 CONFIGURE COMMANDS

The following commands allow the Test Set to control another device using serial RS-232 communication. Commands unique to the device controlled are sent as strings. Responses are received as strings.

SYSTem:PTHRough:SERial *"string"*
Passes the *string* through the RS-232 Connector.

SYSTem:PTHRough:SERial?
Waits for and returns a string from the RS-232 Connector.

SYSTem:PTHRough:SERial:QUEue?
Returns a non-zero value if data is in the RS-232 queue, 0 if the RS-232 queue is empty.

SYSTem:PTHRough:SERial:KEY?
Waits for and returns one character from the RS-232 Connector.

SYSTem:DEFault
Resets all unit settings to factory defaults with these exceptions: 1) All RCI macros are defined, 2) Any currently executing RCI macro continues to execute and 3) All stored setups, stored frequency lists and stored scope/analyzer traces are not affected.

NOTE: Communications parameters reset to default values! If this command is issued via RS-232 or GPIB, follow the command on the same line with instructions to restore communications with the host.

Example: SYST:SEC OFF
SYST:DEFAULT;:SYST:COMM:SER:BAUD 38400

6-17 SETUP COMMANDS

SETUP commands establish the routings for various Operation Modes without displaying the Operation Screens on the CRT. The SETUP commands force the COM-120B to switch to page 1 (a blank screen) but performs all the hardware setups.

SETUP:ANALyzer
Configures for independent Spectrum Analyzer.

SETUP:BER
Configures for the BER meter.

SETUP:DUPlex:GENerator
Configures for the Duplex Generator Operation.

SETUP:DUPlex:GENerator DISTortion
Configures for the Dependent Distortion Meter Operation.

SETUP:DUPlex:GENerator AFLevel
Configures for the AF Level Meter Operation.

SETUP:DUPlex:GENerator SINad
Configures for the Dependent SINAD Meter Operation.

SETUP:DUPlex:GENerator SCOPe
Configures for the Dependent Oscilloscope Operation.

SETUP:DUPlex:GENerator ANALyzer
Configures for the Dependent Spectrum Analyzer Operation.

SETUP:DUPlex:RECeiver
Configures for the Duplex Receiver Operation.

SETUP:DUPlex:RECeiver LEVel
Configures for the Dependent Received Level Meter.

SETUP:DUPlex:RECeiver MODulation
Configures for the Modulation Meter.

SETUP:DUPlex:RECeiver DISTortion
Configures for the Dependent Distortion Meter.

SETUP:DUPlex:RECeiver AFCounter
Configures for the Dependent AF Meter.

SETUP:DUPlex:RECeiver POWer
Configures for the Power Meter.

SETUP:DUPlex:RECeiver SINad
Configures for the Dependent SINAD Meter.

SETUP:DUPlex:RECeiver SCOPe
Configures for the Dependent Oscilloscope.

SETUP:DUPlex:RECeiver ANALyzer
Configures for the Dependent Spectrum Analyzer Operation.

SETUP:DUPlex:RFERror
Configures for the Frequency Error Meter.

SETUP:DUPlex:RECGen
Configures for the Duplex Operation.

SETUP:FGENerator
Configures for the Audio/Data/Signal Generators.

SETUP:GENerator
Configures for the Generator Operation.

SETUP:GENerator DISTortion
Configures for the Dependent Distortion Meter Operation.

SETUP:GENerator AFLevel
Configures for the AF Level Meter Operation.

SETUP:GENerator SINad
Configures for the Dependent SINAD Meter.

SETUP:GENerator SCOPe
Configures for the Dependent Oscilloscope Operation.

SETUP:GENerator ANALyzer
Configures for the Dependent Spectrum Analyzer Operation.

SETUP:METers DISTortion
Configures for the Independent Distortion Meter Operation.

SETUP:METers SINad
Configures for the Independent SINAD Meter Operation.

SETUP:METers AFCounter
Configures for the Independent AF Counter Meter.

SETUP:METers DVM
Configures for the Independent DVM.

SETUP:RECeiver
Configures for the Receiver Screen Operation.

SETUP:RECeiver LEVel
Configures for the Dependent Received Level Meter.

SETUP:RECeiver MODulation
Configures for the Modulation Meter.

SETUP:RECeiver DISTortion
Configures for the Dependent Distortion Meter Operation.

SETUP:RECeiver AFCounter
Configures for the Dependent AF Counter Meter.

SETUP:RECeiver POWer
Configures for the Power Meter.

SETUP:RECeiver SINad
Configures for the Dependent SINAD Meter.

SETUP:RECeiver SCOPe
Configures for the Dependent Oscilloscope.

SETUP:RECeiver ANALyzer
Configures for the Dependent Spectrum Analyzer Operation.

SETUP:RECeiver RFERror
Configures for the RF Error Meter.

SETUP:SCOPe
Configures for the Independent Oscilloscope Operation.

SETUP:SETup
Configures for the Setup Menu.

SETUP:TRUNKing RADIOSimulation
Configures for the LTR® Radio Simulator Operation

SETUP:TRUNKing REPeater
Configures for the LTR® Repeater Simulator Operation.

SETUP:TRUNKing AUXSetup
Configures for the LTR® Auxillary Setup Operation.

SETUP:FLIST
Configures for the Frequency List Operation.

SETUP:STFList
Configures for the Stored Frequency List Operation.

6-18 DISPLAY COMMANDS

DISPLAY commands establish the routings for various Operation Modes and display the Operation Screens on the CRT.

DISPLAY:ANALyzer
Displays independent Spectrum Analyzer.

DISPLAY:BER
Displays the BER meter.

DISPLAY:DUPlex:GENerator
Displays the Duplex Generator Operation.

DISPLAY:DUPlex:GENerator DISTortion
Displays the Dependent Distortion Meter Operation.

DISPLAY:DUPlex:GENerator AFLevel
Displays the AF Level Meter Operation.

DISPLAY:DUPlex:GENerator SINad
Displays the Dependent SINAD Meter Operation.

DISPLAY:DUPlex:GENerator SCOPe
Displays the Dependent Oscilloscope Operation.

DISPLAY:DUPlex:GENerator ANALyzer
Displays the Dependent Spectrum Analyzer Operation.

DISPLAY:DUPlex:RECeiver
Displays the Duplex Receiver Operation.

DISPLAY:DUPlex:RECeiver LEVel
Displays the Dependent Received Level Meter.

DISPLAY:DUPlex:RECeiver MODulation
Displays the Modulation Meter.

DISPLAY:DUPlex:RECeiver DISTortion
Displays the Dependent Distortion Meter.

DISPLAY:DUPlex:RECeiver AFCounter
Displays for the Dependent AF Meter.

DISPLAY:DUPlex:RECeiver POWer
Displays the Power Meter.

DISPLAY:DUPlex:RECeiver SINad
Displays the Dependent SINAD Meter.

DISPLAY:DUPlex:RECeiver SCOPe
Displays the Dependent Oscilloscope.

DISPLAY:DUPlex:RECeiver ANALyzer
Displays the Dependent Spectrum Analyzer Operation.

DISPLAY:DUPlex:RFERror
Displays the Frequency Error Meter.

DISPLAY:DUPlex:RECGen
Displays the Duplex Operation.

DISPLAY:FGENerator
Displays the Audio/Data/Signal Generators.

DISPLAY:GENerator
Displays the Generator Operation.

DISPLAY:GENerator DISTortion
Displays the Dependent Distortion Meter Operation.

DISPLAY:GENerator AFLevel
Displays the AF Level Meter Operation.

DISPLAY:GENerator SINad
Displays the Dependent SINAD Meter.

DISPLAY:GENerator SCOPe
Displays the Dependent Oscilloscope Operation.

DISPLAY:GENerator ANALyzer
Displays the Dependent Spectrum Analyzer Operation.

DISPLAY:METers DISTortion
Displays the Independent Distortion Meter Operation.

DISPLAY:METers SINad
Displays the Independent SINAD Meter Operation.

DISPLAY:METers AFCounter
Displays the Independent AF Counter Meter.

DISPLAY:METers DVM
Displays the Independent DVM.

DISPLAY:RECeiver
Displays the Receiver Screen Operation.

DISPLAY:RECeiver LEVel
Displays the Dependent Received Level Meter.

DISPLAY:RECeiver MODulation
Displays the Modulation Meter.

DISPLAY:RECeiver DISTortion
Displays for the Dependent Distortion Meter Operation.

DISPLAY:RECeiver AFCounter
Displays the Dependent AF Counter Meter.

DISPLAY:RECeiver POWer
Displays the Power Meter.

DISPLAY:RECeiver SINad
Displays the Dependent SINAD Meter.

DISPLAY:RECeiver SCOPe
Displays the Dependent Oscilloscope.

DISPLAY:RECeiver ANALyzer
Displays the Dependent Spectrum Analyzer Operation.

DISPLAY:RECeiver RFERror
Displays the RF Error Meter.

DISPLAY:SCOPe
Displays the Independent Oscilloscope Operation.

DISPLAY:SETup
Displays the Setup Menu.

DISPLAY:TRUNKing RADIOSimulation
Displays the LTR® Radio Simulator Operation

DISPLAY:TRUNKing REPeater
Displays the LTR® Repeater Simulator Operation.

DISPLAY:TRUNKing AUXSetup
Displays the LTR® Auxillary Setup Operation.

DISPLAY:FLIST
Displays the Frequency List Operation.

DISPLAY:STFList
Displays the Stored Frequency List Operation.

DISPLAY:FLIST
Displays the Frequency List Screen.

DISPLAY:STFList
Displays the Stored Frequency List Operation Screen.

SECTION 7 - OPTIONS

7-1 INTERNAL BATTERY (OPTION 01)

Provides self-contained dc power when external ac or dc power is unavailable.

7-2 OVEN CRYSTAL OSCILLATOR FREQUENCY STANDARD (OPTION 02)

OCXO replaces the standard TCXO as system time base. Provides 0.01 x 10^{-6} accuracy.

7-3 30 kHz IF FILTER (OPTION 03)

Provides additional band limiting between 15 kHz and 300 kHz offered in standard set. Required for AMPS Mobile Station Test (Option 15).

7-4 VARIABLE AUDIO GENERATOR 2 (OPTION 04)

Replaces standard fixed 1 kHz Audio Generator with variable frequency Audio Generator. Optional Audio Generator has frequency range of 5 to 20000 Hz with sine wave shape and 5 to 10000 Hz with ramp, triangle and square wave shapes.

Optional Audio Generator 2 is available for use on the RF Generate, Duplex and Duplex Generate Operation Screens as a modulation source. Additionally, it is available for baseband output from the Audio/Data/ Signalling Generators Operation Screen.

7-5 GENERATE AMPLIFIER (OPTION 05)

The Generate Amplifier is an internal RF Amplifier providing 26 dB gain for AUX RF OUT Connector. With Option 05 installed, RF AUX OUT Connector output range is -130 to +13 dBm for all Operation Modes.

7-6 DATA GENERATOR/BIT ERROR RATE (BER) METER (OPTION 07)

7-6-1 BER METER DESCRIPTION

The BER Meter is accessed by first pressing SPCL TEST MODE Key and selecting the Bit Error Rate Test. The BER Meter is designed to be used in Baseband, RF Generate, RF Receive or Duplex Mode. The complexity of the BER Meter is best described in four separate sections.

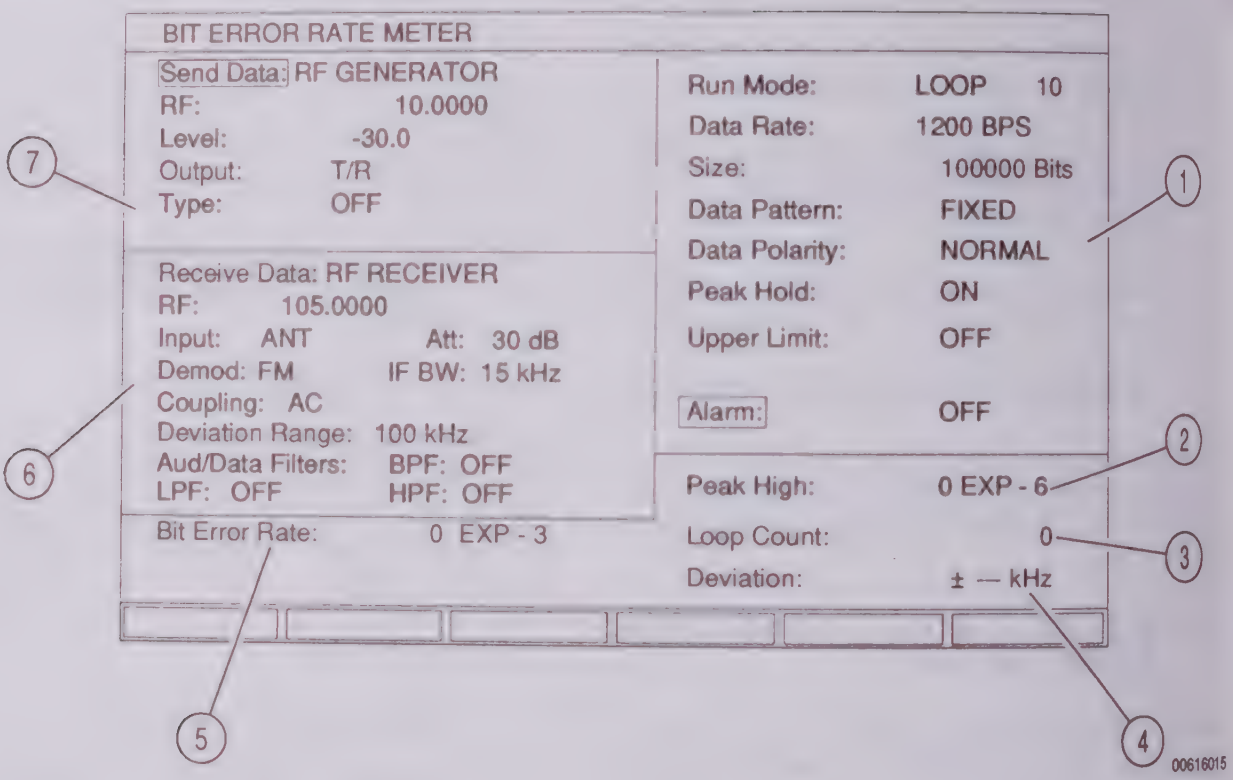
BER Meter General Operation Screen

BER Meter Configuration Section

Receive Data Configuration Section

Send Data Configuration Section

A. BER METER GENERAL OPERATION SCREEN



1. BER Meter Configuration Section

   Contains configuration data for signal.

2. Peak Reading

   Displays highest Bit Error Rate for current test.

3. Loop Count

   Displays number of times Data has been sent.

4. Input Level Indicator

   Displays the modulation or voltage level of the Receive Data input source. The level indicator displays an AF Level Meter reading when the field is set for AUDIO/DATA IN.

   When the field is set for RF RECEIVER, the Demod field determines the display (i.e., FM-Deviation Meter in kHz, AM-Modulation Meter in % or PM-Phase Meter in Rad).

5. Bit Error Rate

   Displays Bit Error Rate. Exponent changes depending on Data Pattern Size (11).

6. Receive Data Configuration Section

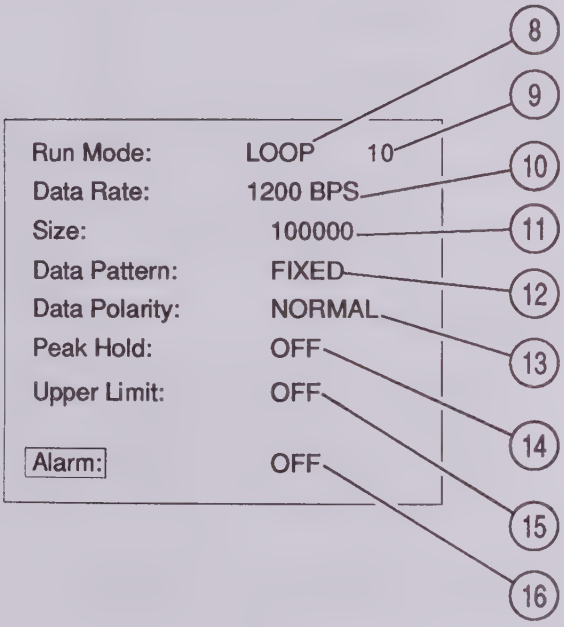
   Contains configuration data for Receive.

7. Send Data Configuration Section

   Contains configuration data for Generate Section.

B. BER METER CONFIGURATION SECTION

This section contains the parameters for setting the message size, rate and pattern as well as information on configuring the BER Meter. Functions and parameters for the BER Meter Configuration Section are as follows:



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8. Run Mode

Displays selected Operation Mode. Selections include Continuous (CONTIN.) and LOOP. When LOOP Mode is selected, LOOP Number (9) is displayed.

Soft Function Keys available with this function include

F1 CONTIN
Selects Continuous Run Mode.

F2 LOOP
Selects LOOp Run Mode.

F6 RETURN
Returns Operation to Special Test Menu.

9. LOOP Number

Displays selected number of Data Patterns to be Generated. Displayed only with LOOP selected for Run Mode (8). Range is 1 to 100000.

10. Data Rate

Displays selected Data Rate in Bits Per Second (BPS). Selections include:

75 BPS	150 BPS	300 BPS
600 BPS	1200 BPS	2400 BPS
4800 BPS	9600 BPS	

Soft Function Keys available with this function include:

F1 MENU
Accesses menu for selecting Data Rate.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

11. Data Pattern Size

Displays selected Data Pattern Size. Selections range from 128 to 100000 bits.

12. Data Pattern Type

Displays selected Data Pattern Type. Selections are RANDOM and FIXED.

FIXED is an 8 bit hexadecimal pattern that is repeated. RANDOM is based on a pseudorandom seed.

Soft Function Keys available with this function include:

F1 RANDOM
Selects RANDOM Data Pattern Type.

F2 FIXED
Selects FIXED Data Pattern Type.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

13. Data Polarity

Displays selected Data Polarity Type. Displays NORMAL or INVERTED. INVERTED is the opposite code of NORMAL.

Soft Function Keys available with this function include:

F1 NORMAL
Selects NORMAL Data Polarity.

F2 INVERTED
Selects INVERTED Data Polarity.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

Operation Mode. Selections include Continuous (CONTIN.) and LOOP. When LOOP Mode is selected, LOOP Number (2) is displayed.

14. Peak Hold

Displays selected Peak Hold Function Status. Status is OFF or ON. When ON, Peak Reading (2) is displayed.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

15. Upper Limit

Displays selected Upper Limit. Status is OFF or ON. When ON Upper Limit Value is displayed. Range of Upper Limit Value is 0×10^{-6} to 999×10^{-3}.

Soft Function Keys available with this function include:

F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

16. Alarm

Displays Alarm status. Status is OFF or ON. Alarm sounds when Upper Limit (15) is exceeded.

Soft Function Keys available with this function include:

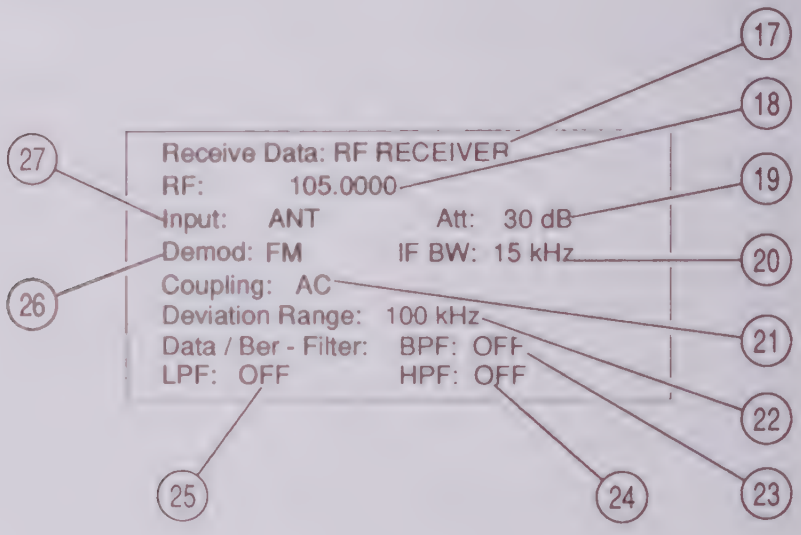
F1 OFF/ON
Toggles Peak Hold Function ON and OFF.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

C. RECEIVE DATA CONFIGURATION SECTION

This section contains the parameters for setting the Receiver Portion of the BER Meter. Functions and parameters for the Receiver portion of the BER Meter are as follows:



00607095

17. Receive Data Input

Displays selected Input for BER Meter. Selections include RF RECEIVER and AUDIO DATA IN. Selecting RF RECEIVER means an RF Carrier is demodulated to receive the Data Signal. Selecting AUDIO DATA IN means Data Signal is received directly through the AUDIO/DATA IN Connector.

Soft Function Keys available with this function include:

F1 RF REC
Selects RF RECEIVER (either T/R or ANT ports) as BER Meter Input.

F2 DATA IN
Selects AUDIO DATA IN as BER Meter Input.

F6 RETURN
Returns Operation to Special Test Menu.

The following items are displayed only when RF RECEIVER is selected as Receive Data Input (17):

18. RF Field

Displays RF Receive Frequency. Selections range from .0000 to 1000 MHz.

19. Attenuation

Displays Input Attenuation. Selections are 0 or 30 dB.

Soft Function Keys available with this function include:

F1 30 dB
Selects 30 dB Input Attenuation.

F2 0 dB
Selects 0 dB Input Attenuation.

20. IF Bandwidth

Displays IF Filter Bandwidth. Selections are 300 and 15 kHz.

Soft Function Keys available with this function include:

F1 300 kHz
Selects 300 kHz IF Filter.

F2 15 kHz
Selects 15 kHz IF Filter.

21. Coupling

Displays Coupling Type for RF Receiver. Displayed only with FM selected for Demod Type (26). Selections are AC or DC.

Soft Function Keys available with this function include:

F1 AC
Selects AC Coupling.

F2 DC
Selects DC Coupling.

F5 FM-Z
Zeroes the FM Deviation Meter for proper readings.

F6 RETURN
Returns Operation to Special Test Menu.

22. Deviation Range

Displays FM Deviation Range. Displayed only with FM selected for Demod Type (26). Selections are 10, 20, 50 and 100 kHz.

Soft Function Keys available with this function include:

F1 10 kHz
Selects 10 kHz Deviation Range.

F2 20 kHz
Selects 20 kHz Deviation Range.

F3 50 kHz
Selects 50 kHz Deviation Range.

F4 100 kHz
Selects 100 kHz Deviation Range.

F6 RETURN
Returns Operation to Special Test Menu.

23. Bandpass Filter

Displays Bandpass Filter setting for demodulated signal. Selections include OFF and C-MSG (C-Message Weighted Filter).

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF.

F2 C-MSG
Activates C-Message Weighted Bandpass Filter.

24. High-Pass Filter

Displays current High-Pass Filter setting for demodulated signal. Selections include OFF, 300 Hz and 4 kHz.

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF.

F2 300 Hz
Activates 300 Hz High-Pass Filter.

F3 4 kHz
Activates 4 kHz High-Pass Filter.

25. Low-Pass Filter

Displays current Low-Pass Filter setting for demodulated signal. Selections include OFF, 300 Hz, 4 kHz and 20 kHz.

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF.

F2 300 Hz
Activates 300 Hz Low-Pass Filter.

F3 4 kHz
Activates 4 kHz Low-Pass Filter.

F4 20 kHz
Activates 20 kHz Low-Pass Filter

26. Demod Type

Displays Demodulation Type. Selections include FM, AM and PM. Selection of FM activates Coupling (21) and Deviation Range (22) Fields.

Soft Function Keys available with this function include:

F1 FM
Selects FM as Demodulation Type.

F2 AM
Selects AM as Demodulation Type.

F3 PM
Selects PM as Demodulation Type.

27. Input

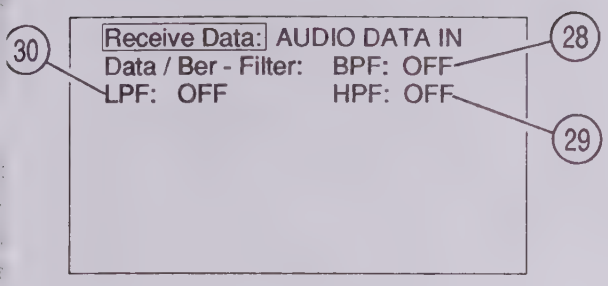
Displays signal Input Connector. Selections include T/R (T/R Connector) and ANT (ANTENNA Connector).

Soft Function Keys available with this function include:

F1 T/R
Selects T/R Connector as Input Connector.

F2 ANT
Selects ANTENNA Connector as Input Connector.

The following items are displayed only when AUDIO DATA IN is selected as Receive Data Input (17):



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28. Bandpass Filter

Displays current Bandpass Filter setting for signal passed through AUDIO/DATA IN Connector. Selections include OFF and C-MSG (C-Message Weighted Filter).

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF.

F2 C-MSG
Activates C-Message Weighted Bandpass Filter.

29. High-Pass Filter

Displays current High-Pass Filter setting for signal passed through AUDIO/DATA IN Connector. Selections include OFF, 300 Hz and 4 kHz.

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF.

F2 300 Hz
Activates 300 Hz High-Pass Filter.

F3 4 kHz
Activates 4 kHz High-Pass Filter.

30. Low-Pass Filter

Displays current Low-Pass Filter setting for signal passed through AUDIO/DATA IN Connector. Selections include OFF, 300 Hz, 4 kHz and 20 kHz.

High-Pass Filter/Low-Pass Filter combination and Bandpass Filter cannot be active simultaneously.

Soft Function Keys available with this function include:

F1 OFF
Sets Bandpass Filter to OFF.

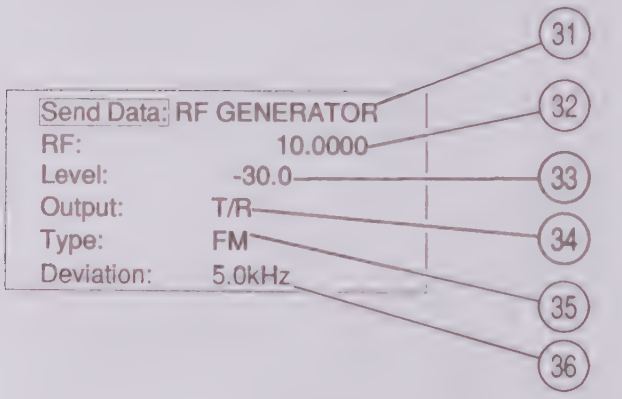
F2 300 Hz
Activates 300 Hz Low-Pass Filter.

F3 4 kHz
Activates 4 kHz Low-Pass Filter.

F4 20 kHz
Activates 20 kHz Low-Pass Filter

D. SEND DATA CONFIGURATION SECTION

This section contains the parameters for setting the Transmitter Portion of the BER Meter. Functions and parameters for the Transmitter portion of the BER Meter are as follows:



00607097

31. Send Data Output

Displays selected Output for BER Meter. Selections include RF GENERATOR and AUD/DATA GEN OUT. Selecting RF GENERATOR means an RF Carrier is modulated with the Data Signal before transmission. Selecting AUD/DATA GEN OUT means Data Signal is transmitted directly through the AUDIO/DATA GEN Connector.

Soft Function Keys available with this function include:

F1 RF GEN
Selects RF Generator as BER Meter source.

F2 DATA GEN
Selects Data Signal output through AUDIO/DATA GEN Connector.

F5 RST PK
Resets Peak Hold Function.

F6 RETURN
Returns Operation to Special Test Menu.

The following items are displayed only when RF GENERATOR is selected as Send Data Output (31):

32. RF Field

Displays RF Generator Frequency. Selections range from .0000 to 1000 MHz.

33. Level

Displays RF Generator output Level. Selections range from -130 to -30 dBm with T/R Connector selected as Output (34). Selections range from -130 to -13 dBm with AUX RF OUT Connector selected as Output (34).

34. Output

Displays Output Connector. Selections include AUX (AUX RF OUT Connector) and T/R (T/R Connector).

Soft Function Keys available with this function include:

F1 T/R
Selects T/R Connector for Output.

F2 AUX
Selects AUX RF OUT Connector for Output.

35. Modulation Type

Displays Modulation Type. Selections include OFF, AM, FM and PM.

Soft Function Keys available with this function include:

F1 OFF
Set Modulation Source to OFF.

F2 AM
Selects AM for Modulation Type.

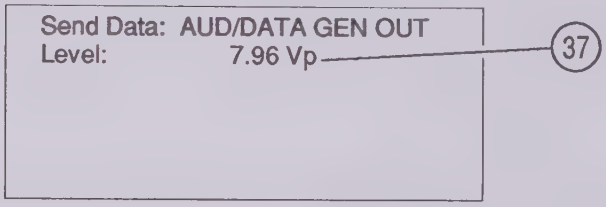
F3 FM
Selects AM for Modulation Type.

F4 PM
Selects AM for Modulation Type.

36. Modulation/Deviation Level

Displays Modulation Level. Selections range from 0.0% to 100% for AM Modulation Type (35), 0.00 to 100 kHz for FM Modulation Type (35) and 0.00 to 10 Rad for PM Modulation Type.

The following items are displayed only when AUD/DATA GEN OUT is selected as Send Data Output (31):



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37. Output Level

Displays Output Level of Data Signal. Selections range from 0.0 to 2.5 Vp in x1 (times 1) Mode or 0 to 25 mVp in /10 (divide by 10) Mode.

F1 x1
Selects x1 Output Mode.

F2 /10
Selects /10 Output Mode.

7-7 SINGLE SIDEBAND RECEIVE FILTER (OPTION 08)

7-7-1 GENERAL

Installation of the Single Sideband Receive IF Filter provides the ability to monitor SSB signals. When Filter is installed, 3 kHz Selection is available for IF Bandwidth Filter. Additionally, a 3 kHz Soft Function Keys is defined.

The Single Sideband and 30 kHz IF Filters are mutually exclusive. Only one additional IF Filter can be installed.

7-7-2 DESCRIPTION OF RECEIVE FUNCTION

RF Receive Operation is changed as follows:

- Analyzer Center Frequency is offset from center graticule ±1800 Hz, depending on whether Upper Sideband (UB) or Lower Sideband (LB) is selected as Demodulation Type.
- No Modulation Meter is provided for Single Sideband. Either Modulation Reading or Modulation Meter, whichever was last selected, is blanked from the screen.
- RF Error Meter is not provided for Single Sideband. RF Error Meter is blanked from the screen.

Additions and Redefinitions of parameters on the RF Receiver Operation Screen are as follows:

1. Demodulation Type

Includes two additional settings: UB (Upper Sideband) and LB (Lower Sideband).

Soft Function Keys available with this function include:

F4 LB
Selects Lower Sideband Demodulation.

F5 UB
Selects Upper Sideband Demodulation.

2. IF Bandwidth

Includes additional 3 kHz setting.

Soft Function Keys available with this function include:

F3 3 kHz
Selects 3 kHz Optional IF Bandwidth Filter. Renamed depending on Demodulation Type (1).

3. BFO Frequency

Tone/Data Code Field is renamed when UB or LB is selected as Demodulation Type (1). Displays selected adjustment for BFO Frequency. Adjustment range is ±4.0 kHz. No Soft Function Keys are defined when BFO Frequency is displayed.

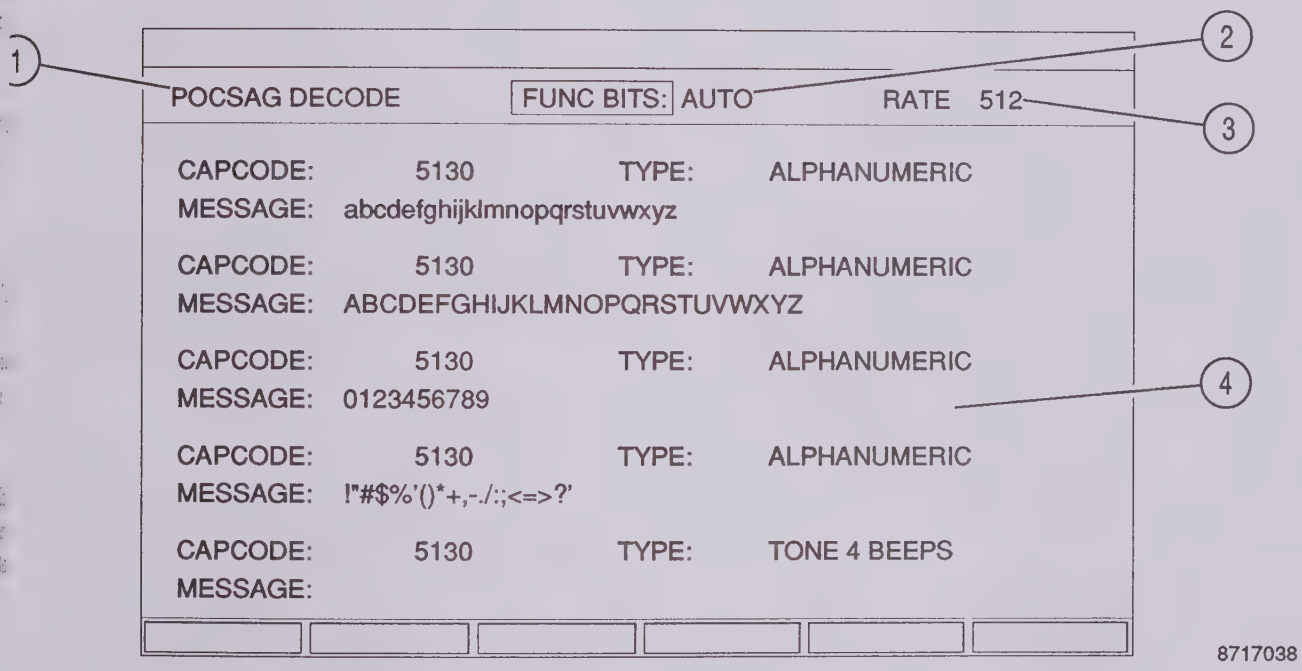
4. AGC Setting

Displays current AGC Setting, AUTO or MANUAL. AUTO provides automatic gain control while MANUAL sets feedback level for automatic gain control to defined level. Selection of MANUAL accesses Feedback Level Data Field. Range is 0 to 1023.

9-3 DECODING DIGITAL SIGNALING FORMATS

ith Option 11 installed, the RF Receive Operation Screen and the Duplex Receive Operation :reen can be configured to decode POCSAG and Inverted POCSAG signals. A specific decode reen is provided for each Digital Signaling format type.

formation provided from the Decode Screens is as follows:



8717038

1. Decode Screen Label

   Identifies whether Decode Screen format is POCSAG or POCSAG INV (Inverted POCSAG).

2. Function

   Allows user to set Message Type to ALPHANO (ALPHANUMERIC), NUMERIC or AUTO. ALPHANO and NUMERIC settings force Decode Function to decode message as specified type. AUTO setting allows Decode Function to determine Message Type from received data.

Soft Function Keys available with this field include:

F1 DECODE
Activates Decode Function. Field is highlighted when active.

F2 STOP
Stops Decode Function.

F3 MENU
Accesses menu for selecting format. Soft Function Keys available with this function include:

F1 AUTO
Allows Decode Function to determine Message Type from received data.

F2 NUMERIC
Forces Decode Function to decode message as specified type.

F3 ALPHANO
Forces Decode Function to decode message as specified type.

F5 SCROLL
Toggles Scroll Function On and Off. Decode Screen (4) holds five messages. With Scroll Function active, when sixth message is received, previous five messages are scrolled up (losing one) and sixth message is displayed. Softkey is highlighted when Scroll Function is active.

F6 RETURN
Returns to previous Operation Screen.

3. Data Rate

Displays selected Data Rate for decoding messages. Selections include 512 and 1200 bps.

Soft Function Keys available with this field include:

F1 DECODE
Activates Decode Function. Field is highlighted when active.

F2 STOP
Stops Decode Function.

F3 MENU
Accesses menu for selecting Data Rate. Soft Function Keys available with this function include:

F1 512
Sets Data Rate to 512 bps.

F2 1200
Sets Data Rate to 1200 bps.

F3 2400
Sets Data Rate to 2400 bps.

F4 AUTO
Automatically decodes 1200 or 2400 baud rate incoming POCSAG data. It *does not* handle 512 baud rate.

F5. SCROLL
Toggles Scroll Function On and Off. Decode Screen (4) holds five messages. With Scroll Function active, when sixth message is received, previous five messages are scrolled up (losing one) and sixth message is displayed. Softkey is highlighted when Scroll Function is active.

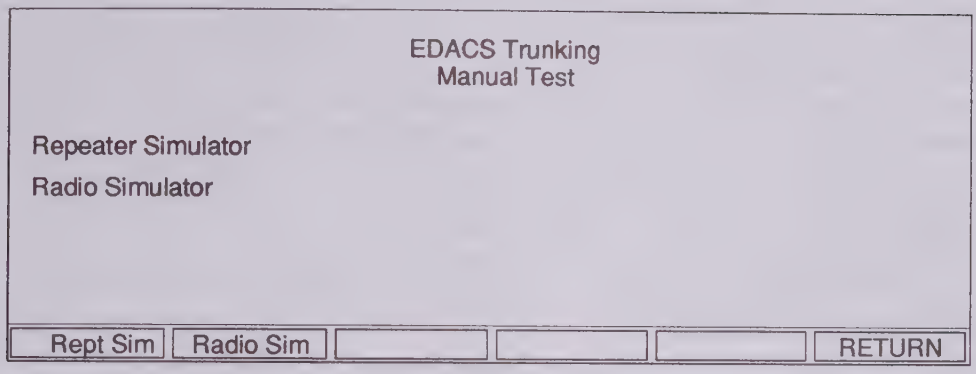
F6 RETURN
Returns to previous Operation Screen.

4. Data Screen

Displays up to five decoded messages. Information displayed includes Capcode, Message Type and Message for each received transmission.

7-14-6 EDACS TRUNKING MANUAL TEST

EDACS Trunking Manual Test Screen:



00616002

The EDACS Trunking Manual Test consists of 2 main parts. A Repeater Simulator for testing EDACS Radios and a Radio Simulator for testing EDACS Repeaters.

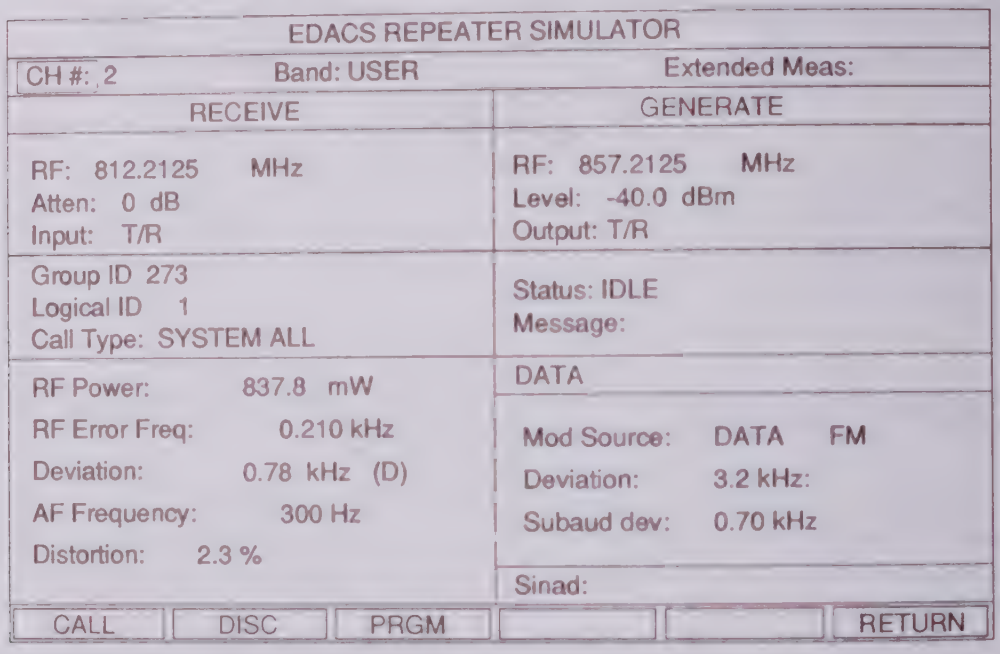
Soft Function Keys available with this function include:

F1 Rept Sim
Accesses the EDACS Repeater Simulator Screen.

F2 Radio Sim
Accesses the EDACS Radio Simulator Screen.

F3 RETURN
Returns to the EDACS Trunking Test screen.

7-14-7 EDACS TRUNKING MANUAL TEST-REPEATER SIMULATOR



00616014

Entering the Repeater Simulator causes the COM-120B to perform an FM-Zero operation to adjust the Receiver's DC offset to zero. The screen displays the message: "Doing FMZ...please wait."

While in the Repeater Simulator and the Radio is not transmitting, or the repeater is not calling the Radio, the Site ID message is continuously transmitting. In this idle mode, the Repeater Simulator is looking for a Call (or Login) request from the Radio. When the request is found, the Repeater Simulator allows the Radio to transmit (until the Radio releases). The Group/Logical ID's are captured (and displayed) when the Group Call is made (and used to call a Radio). A Radio's Login is also decoded by the simulator and the ID's captured. There is also a mode of operation (activated by softkey) where the repeater simulates a Radio calling the Radio Under Test. In this mode, there are softkeys to disconnect and return back to the idle state.

1. CH#:

This field is used to change the EDACS Repeater Simulator Working Channel, as specified by the Channel Number pre-programmed in the Setup Screen. Value range: 1 to 20. The corresponding RF Frequencies are shown in the RF fields as the CH# field is edited. This only sets the Working Channel. The Control Channel is taken from the Setup Screen and must be changed there if necessary.

If the Band field is set to 'Manual' there is no channel number to edit. The PRGM Soft Function Key F3 may then be used to return to the channel Band mode.

Soft Function Keys available with this function include:

F1 CALL
Makes a Group Call to the Radio, simulating a call from another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call to the Radio which was made previously using the CALL softkey.

F3 PRGM
Puts the 'Band' mode back to one of the channel modes: 800 MHz, 900 MHz or USER. The logical channels from the Setup Screen are then active. The simulator is taken out of the pre-programmed channel mode when the RF Frequencies are manually edited.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

2. Band:

This field shows the channel format for the Repeater Simulator Working Channel. Valid values are: 800 MHz, 900 MHz, USER or Manual. Display-only field. If 'Manual' is displayed, the RF Frequencies have been set manually in the Repeater Simulator. All other values are taken from the pre-programmed logical channels from the Setup Screen, according to the channel number set in the CH# field.

3. RF: (Receive)

This field shows the current RF Frequency of the EDACS Working Channel for the Receiver side of the Repeater Simulator. This field is editable (which puts the Working Channel in 'Manual' mode). Value range: 0 to 1000.0000 MHz.

Soft Function Keys available with this function include:

F1 CALL
Makes a Group Call to the Radio, simulating a call from another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call to the Radio which was made previously using the CALL softkey.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

4. Atten:

This field is used to set the Receiver Attenuation. Value range: 0 or 30 dB.

F1 30 dB
Sets the Receiver Attenuation to 30 dB.

F2 Sets the Receiver Attenuation to 0 dB.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

5. Input:

This field is used to select the Receiver's RF Input for the Repeater Simulator to the T/R or Antenna connector. Valid values are T/R or ANT.

Soft Function Keys available with this function include:

F1 T/R
Sets the Receiver Input to T/R.

F2 ANT
Sets the Receiver Input to ANT.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

6. Group ID:

This field shows the Radio's Group ID acquired from a Group Call or Login operation (if performed). This field is also used for the Group ID when making a call to the Radio Under Test. This field is editable. Value range: 0 to 2047.

Soft Function Keys available with this function include:

F1 CALL
Makes a Group Call to the Radio, simulating a call from another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call to the Radio which was made previously using the CALL softkey.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

7. Call Type:

This field handles outgoing call processing selections Group, Individual or System-All calls, for Radio and Repeater-initiated calls.

Soft Function Keys available with this function include:

F1 CALL
Makes current selected Call to the Radio, simulating a call from another radio. The ID's used to make the call are taken from the Group/Logical ID fields. For Individual Call, the Caller ID used is one less than the programmed Logical ID.

F2 DISC
Disconnects a call to the Radio which was made previously using the CALL softkey.

F3 GROUP
Group Call is selected and starts when softkey is pressed.

F4 SYS ALL
System-All Call is selected and starts when softkey is presed.

F5 INDV
Individual Call is selected and starts when softkey is pressed.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

8. Logical ID:

This field shows the Radio's Logical ID acquired from a Group Call or Login operation (if performed). This field is also used for the Logical ID when making a call to the Radio Under Test. This field is editable. Value range: 0 to 16383.

Soft Function Keys available with this function include:

F1 CALL
Makes the current selected Call to the Radio, simulating a call

from another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call to the Radio which was made previously using the CALL softkey.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

9. RF Power:

This field shows the Radio's Transmitter RF Power in Watts (or mW). It is a display-only field (meter) with no cursor position. Value range: 0.0 mW to 10.00 W.

10. RF Error Freq:

This field shows the Radio's Transmitter RF Frequency Error in kHz. It is a display-only field (meter) with no cursor position. Value range: ±0.000 to 5.000 kHz.

11. Deviation: (Receive)

This field shows the Radio's Transmit Deviation for Voice or Data in kHz. Voice Deviation is designated with a 'V' symbol, and Data Deviation (low-frequency data) is designated with a 'D' symbol. Value range: 0.00 to 10.00 kHz.

Soft Function Keys available with this function include:

F1 DATA
Shows deviation of low-frequency (data) modulations.

F2 VOICE
Shows voice-range frequency modulations.

F3 FMZ
Used to FM-Zero the Receiver, which adjusts the DC offset to zero. Do this operation if the Radio is having trouble completing a Group Call.

F4 FM CAL
Makes an attempt to move the DC offset to zero in the Receiver. ***Not a recommended operation. The FMZ softkey should be tried first if the Radio does not complete a Group Call. This operation may work on a Radio Under Test that is extremely far off frequency. May require more than one try.***

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

12. AF Frequency:

This field shows the Radio's Transmitter Audio Frequency in Hz. It is a display-only field (meter) with no cursor position. Measuring range: 300 to 4500 Hz.

13. Distortion: (Receive)

This field shows the Radio's Transmitter Distortion in %. Value range: 0.0 to 20.0%. Also used to show decoded DTMF digits by pressing the DTMF softkey.

Soft Function Keys available with this function include:

F1 DIST
Selects Distortion readings (meter).

F2 OFF
Disable Distortion or DTMF readings.

F3 DTMF Selects DTMF decoding.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

14. Extended Meas:

This field allows access to one of three external screens: Scope, Analyzer or Digital Voltmeter (DVM). Radio-initiated Group Calls are still performed while in any of the three screens. If a call was made to the Radio and is still in progress, it is possible to access any of the three screens without interrupting the call. *However, there is no way to call the Radio Under Test or disconnect a made call while in the extended screens. The call must be made before entering an extended screen.* The *only* way to enter the extended screens is to use the softkeys. The 'Return' field in the extended screen allows a return to the Repeater Simulator.

Soft Function Keys available with this function include:

F1 SCOPE
Accesses the Scope Screen.

F2 ANALY
Accesses the Analyzer Screen.

F3 DVM
Accesses the Digital Voltmeter Screen.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

15. RF: (Generate)

This field shows the current RF Frequency of the EDACS Working Channel for the Generator side of the Repeater Simulator. This field is editable (which puts the Working Channel in 'Manual' mode). Value range: 0 to 1000.0000 MHz.

Soft Function Keys available with this function include:

F1 CALL
Makes a Group Call to the Radio, simulating a call from another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call to the Radio which was made previously using the CALL softkey.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

16. Level:

This field is used to set the Generator's RF Output Level in dBm. Value range: -40 to -130.0 dBm (T/R), 13.0 to -130.0 dBm (AUX) with AUX option.

Soft Function Keys available with this function include:

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

17. Output:

This field is used to set the Generator's RF Output source to the T/R port or the Auxiliary (AUX) RF port. Valid values: T/R or AUX.

F1 T/R
Sets the Generator RF Output to the T/R connector.

F2 AUX
Sets the Generator RF Output to the AUX connector.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

18. Status:

This field shows the current status of the Repeater Simulator. It is a display-only field. Valid status values:

IDLE
Repeater is in the idle state, generating overhead (Site ID) messages. In this state, the Radio may initiate a Group Call, do a Login or the simulator may initiate another call to another radio.

RADIO SETUP
Repeater is in the process of processing a Call from the Radio. *This message is usually very brief and may not be noticeable.*

RADIO INIT
Repeater successfully completes a Call from the Radio and call is in progress.

REP INIT
Repeater made a Group Call to the Radio.

19. Message:

Briefly shows the last EDACS message received from the Radio. Display-only field.

GROUP CALL
A Group Call message is received from the Radio

UN-KEYED
An un-keyed message is received from the Radio.

EMER GROUP
An Emergency Group Call message is received from the Radio.

LOGIN
A Login message is received from the Radio.

STATUS
A Status message is received from the Radio.

INDV CALL *(Log ID)*
An Individual Call is received from the radio. The Logical ID of the radio being called is shown in parenthesis.

SYSTEM ALL
A System-All Call is received from the radio.

20. Mod Source:

This field is used to select a Generator source for modulation. GEN1, GEN2 and DTMF are only modulated when a call is made to the Radio. The DATA modulation field is used to modulate the EDACS signaling data. All enabled modulation sources display above the Mod Source field.

Soft Function Keys available with this function include:

F1 GEN1
Selects Function Generator 1 as the modulation source.

F2 GEN2
Selects Function Generator 2 as the modulation source.

F3 DATA
Selects Data Generator as the modulation source.

F4 DTMF
Selects DTMF as the modulation source.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

In the field to the right of Mod Source, select the modulation type for the selected source.

Soft Function Keys available with this function include:

F1 OFF
Turn off the selected Generator source.

F2 AM
Sets the selected Generator source for AM modulation.

F3 FM
Sets the selected Generator source for FM modulation.

F4 PM
Sets the selected Generator source for PM modulation.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

21. Deviation: (Generate)

This field is active when the selected source is FM or PM modulation type. This controls the deviation of the modulated source. Value range: 0.00 to 100.0 kHz for FM and 0.00 to 10.0 Rad for PM. *For deviation of DATA, 3.2 kHz is the recommended default value.*

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

22. Modulation:

This field is active when the selected source is AM modulation type. This controls the modulation of the selected source. Value range: 0.0% to 100.0%.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

23. Frequency:

This field is active when the selected source, GEN1 or GEN2, is modulated. This selects the Audio Frequency of the selected Function Generator source (sine wave). Value range: 0.0 Hz to 20000.0 Hz.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

Subaud dev:

This field is active when the selected source, DATA, is modulated. This controls the deviation of the sub-audible data used during established call processing with the EDACS Radio. Value range: 0.00 to 100.0 kHz. *Should be ≤ Deviation (20). The recommended default value is 0.70 kHz.*

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

Code:

This field is active when the selected source, DTMF, is modulated. This allows the entry of desired DTMF digits to use for DTMF source generation.

F1 CLEAR
Clears out any DTMF digits previously programmed in.

F2 CONT
Puts the DTMF Generation in the continuous mode.

F3 BURST
Used to one-shot the DTMF Generator source.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

26. Sinad:

This field is used to select a meter to read signals from the Audio/Data/ SINAD input baseband jack. The measurements appear to the right of this field. Valid selections:

Soft Function Keys available with this function include:

F1 DIST
Selects the Distortion meter for baseband measurements.

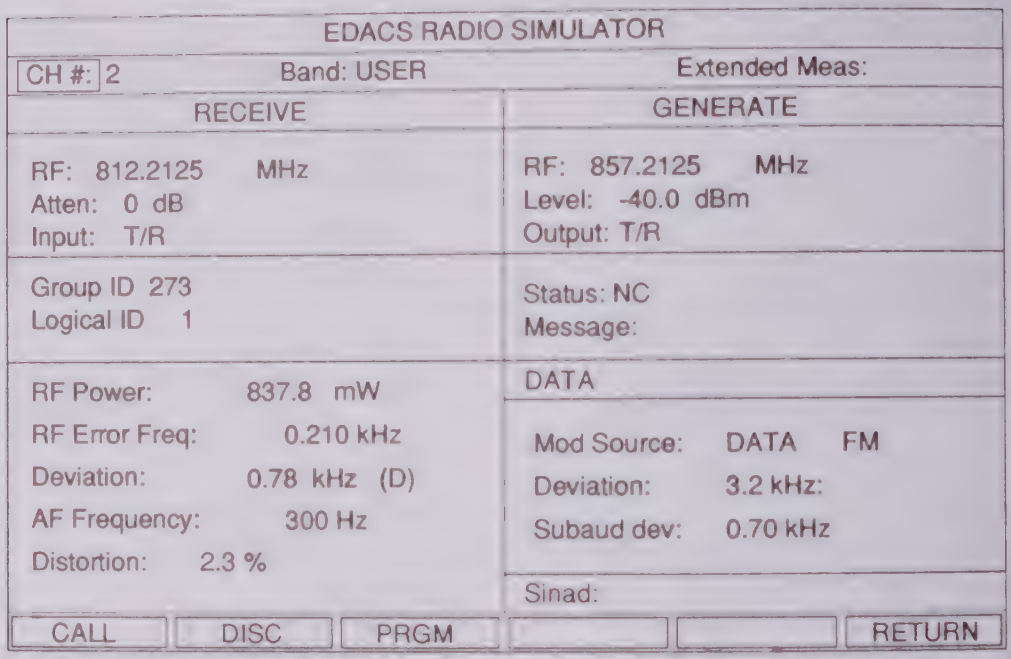
F2 SINAD
Selects the SINAD meter for baseband measurements.

F3 AF LVL
Selects the AF Level meter for baseband measurements.

F4 OFF
Disables baseband measuring.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

When baseband measurements are made, all receiver measurements including the DSP data decoding are disabled due to hardware limitations. Therefore an EDACS Radio-initiated call cannot be made with any baseband measurements enabled. The Radio-initiated call must be made first, then the baseband measurements may be enabled during the call. Calling the Radio may be done at any time.



00616013

Entering the Repeater Simulator causes the COM-120B to perform an FM-Zero operation to adjust the Receiver's DC offset to zero. The screen displays the message: "Doing FMZ...please wait."

While in the Radio Simulator the Control Channel is continually monitored looking for SITE-ID from the controller. If not found, the NC status is shown. When a SITE-ID message is found, the status goes to IDLE. This allows Group Calls to be made (Push-to-Talk) or calls to be made to the COM-120B from another Radio as dictated by the Repeater. There are 3 main call-processing sequences supported in the Radio Simulator. Perform a Group Call, receive a call in response to a Channel Assignment message from a Repeater and receive a call in response to a Channel Update message from a Repeater (if coming on-line during a call).

Several error conditions can occur during the Radio Simulation. Error messages display briefly under these conditions. The error messages:

LOST CHANNEL
: The Radio has lost contact with the Repeater during a Group Call.

CHAN OUT OF RANGE
: A channel assignment from the Repeater was out of pre-programmed Channel range.

INVALID ID
: An ID other than what was set in the Logical/Group ID fields was used to call the Radio Simulator.

NO UN-MUTE FOUND
: The Repeater has transmitted the channel assignment to the Radio Simulator for calling the simulator, but did not send the Un-mute message on the Working Channel.

NO CHAN ASSGN FOUND
: The Channel Assignment message was not received from the Repeater when a Group Call

(PTT) was executed from the Radio Simulator.

1. CH#:

This field is used to change the EDACS Control Channel Number (pre-programmed in the Setup Screen). Value range: 1 to 20. The corresponding RF Frequencies are shown in the RF fields as the CH# field is edited.

If the Band field is set to 'Manual', there is no channel number to edit. The PRGM Soft Function Key F3 may then be used to return to the channel Band mode.

Soft Function Keys available with this function include:

F1 CALL
Simulates a Group Call (PTT) to another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call (release PTT) which was made previously using the CALL softkey.

F3 PRGM
Puts the 'Band' mode back to one of the channel modes: 800 MHz, 900 MHz or USER. The logical channels from the Setup Screen are then active. The simulator is taken out of the channel mode when the RF Frequencies are manually edited.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

2. Band:

This field shows the channel format for the Radio Simulator Control Channel. Valid values are: 800 MHz, 900 MHz, USER or Manual. Display-only field. If 'Manual' is displayed, the RF Frequencies have been set manually in the Radio Simulator. All other values are taken from the pre-programmed logical channels from the Setup Screen, according to the channel number set in the CH# field.

3. RF: (Receive)

This field shows the current RF Frequency of the EDACS Control Channel for the Receiver side of the Radio Simulator. This field is editable (which puts the Control Channel in 'Manual' mode). Value range: 0 to 1000.0000 MHz.

Soft Function Keys available with this function include:

F1 CALL
Simulates a Group Call (PTT) to another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call (release PTT) which was made previously using the CALL softkey.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

4. Atten:

This field is used to set the Receiver Attenuation. Value range: 0 or 30 dB.

F1 30 dB
Sets the Receiver Attenuation to 30 dB.

F2 Sets the Receiver Attenuation to 0 dB.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

5. Input:

This field is used to select the Receiver's RF Input for the Radio Simulator to the T/R or the Antenna port. Valid values are T/R or ANT.

Soft Function Keys available with this function include:

F1 T/R
Sets the Receiver Input to T/R.

F2 ANT
Sets the Receiver Input to ANT.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

6. Group ID:

This field is used to select Radio Simulator's Group ID that is used when simulating a Group Call (PTT) to another Radio. This field is editable. Value range: 0 to 2047.

Soft Function Keys available with this function include:

F1 CALL
Simulates a Group Call (PTT) to another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call (release PTT) which was made previously using the CALL softkey.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

7. Logical ID:

This field is used to select Radio Simulator's Logical ID that is used when simulating a Group Call (PTT) to another Radio. This field is editable. Value range: 0 to 16383.

F1 CALL
Simulates a Group Call (PTT) to another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call (release PTT) made previously using the CALL softkey.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

8. RF Power:

This field shows the Repeater's Transmitter RF Power in Watts (or mW). A display-only field (meter). Value range: 0.0 mW to 10.00 W.

9. RF Error Freq:

This field shows the Repeater's Transmitter RF Frequency Error in kHz. A display-only field (meter). Value range: ±0.000 to 5.000 kHz.

10. Deviation: (Receive)

This field shows the Repeater's Transmit Deviation for Voice or Data in kHz. A 'V' symbol means Voice Deviation. A 'D' symbol means Data Deviation (low-frequency data). Value range: 0.00 to 100.0 kHz.

Soft Function Keys available with this function include:

F1 DATA
Shows deviation of low-frequency (data) modulations.

F2 VOICE
Shows voice-range frequency modulations.

F3 FMZ
Used to FM-Zero the Receiver, which adjusts the DC offset to zero. Do this operation if the Simulator is having trouble completing a Group Call or going to IDLE status.

F4 FM CAL
Makes an attempt to move the DC offset to zero in the Receiver. ***Not a recommended operation. The FMZ softkey should be tried first if the Radio does not complete a Group Call. This operation may work on a Simulator Under Test that is extremely far off frequency. May require more than one try.***

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

11. AF Frequency:

This field shows the Repeater's Transmitter Audio Frequency in Hz. It is a display-only field (meter) with no cursor position. Measuring range: 300 to 4500 Hz.

12. Distortion: (Receive)

This field shows the Repeater's Transmitter Distortion in %. Value range: 0.0 to 20.0%. Also used to show decoded DTMF digits by pressing the DTMF softkey.

Soft Function Keys available with this function include:

F1 DIST
Selects Distortion readings (meter).

F2 OFF
Disable Distortion or DTMF readings.

F3 DTMF Selects DTMF decoding.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

13. Extended Meas:

This field allows access to one of three external screens: Scope, Analyzer or Digital Voltmeter (DVM). If a Group Call (PTT) was made to another Radio and is still in progress, it is possible to access any of the three screens without interrupting the call. The *only* way to enter the extended screens is to use the softkeys. The 'Return' field in the extended screen allows a return to the Repeater Simulator.

Soft Function Keys available with this function include:

F1 SCOPE
Accesses the Scope Screen.

F2 ANALY
Accesses the Analyzer Screen.

F3 DVM
Accesses the Digital Voltmeter Screen.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

14. RF: (Generate)

This field shows the current RF Frequency of the EDACS Control Channel for the Generator side of the Radio Simulator. This field is editable (which puts the Control Channel in 'Manual' mode). Value range: 0 to 1000.0000 MHz.

Soft Function Keys available with this function include:

F1 CALL
Simulates a Group Call (PTT) to another radio. The ID's used to make the call are taken from the Group/Logical ID fields.

F2 DISC
Disconnects a call (release PTT) which was made previously using the CALL softkey.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

15. Level:

This field is used to set the Generator's RF Output Level in dBm. Value range: -40 to -130.0 dBm (T/R), 13.0 to -130.0 dBm (AUX) with AUX option.

Soft Function Keys available with this function include:

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

16. Output:

This field is used to set the Generator's RF Output source to the T/R port or the Auxiliary (AUX) RF port. Valid values: T/R or AUX.

F1 T/R
Sets the Generator RF Output to the T/R connector.

F2 AUX
Sets the Generator RF Output to the AUX connector.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

17. Status

This field shows the current status of the Radio Simulator. Display-only field. Valid status values:

NC
No Control Channel overhead found from the Repeater. No calls accepted in this state.

IDLE
Radio is locked into a Repeater Site and is waiting to make a Group Call or accept a Group Call.

BEGIN CALL
A Group Call is initiated and call processing with the Repeater is in progress. This message is usually brief.

GROUP CALL
Radio Simulator successfully executed a Group Call and is transmitting/receiving on the Working Channel assigned by the Repeater Under Test. The Working Channel is displayed in parenthesis.

CALLED
A call is made to the Radio Simulator and is transmitting/receiving on the Working Channel assigned by the Repeater Under Test. The words "EMG" is displayed if an Emergency Group Call was made.

18. Message:

Briefly shows the last EDACS message received from the Repeater. Display-only field.

GRP CHAN ASSGN
A Group Call Channel Assignment message is received from the Repeater.

CH UPDATE
A Channel Update message is received from the Repeater.

CALL DROP
A Call Drop message is received from the Repeater.

19. Mod Source:

This field is used to select a Generator source for modulation. Sources are only modulated when a call (PTT) is initiated from the Radio Simulator. The DATA modulation field is to modulate the EDACS signaling data. All enabled modulation sources display above the Mod Source field.

Soft Function Keys available with this function include:

F1 GEN1
Selects Function Generator 1 as the modulation source.

F2 GEN2
Selects Function Generator 2 as the modulation source.

F3 DATA
Selects Data Generator as the modulation source.

F4 DTMF
Selects DTMF as the modulation source.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

To the right of Mod Source, select the modulation type for the selected source.

Soft Function Keys available with this function include:

F1 OFF
Turn off the selected Generator source.

F2 AM
Sets the selected Generator source for AM modulation.

F3 FM
Sets the selected Generator source for FM modulation.

F4 PM
Sets the selected Generator source for PM modulation.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

20. Deviation: (Generate)

This field is active when the selected source is FM or PM modulation type. This controls the deviation of the modulated source. Value range: 0.00 to 100.0 kHz for FM and 0.00 to

10.0 Rad for PM. *For deviation of DATA, 3.2 kHz is the recommended default value.*

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

21. Modulation:

This field is active when the selected source is AM modulation type. This controls the modulation of the selected source. Value range: 0.0% to 100.0%.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

22. Frequency:

This field is active when the selected source, GEN1 or GEN2, is modulated. This selects the Audio Frequency of the selected Function Generator source (sine wave). Value range: 0.0 Hz to 20000.0 Hz.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

23. Subaud dev:

This field is active when the selected source, DATA, is modulated. This controls the deviation of the sub-audible data used during an established call initiated from the Radio Simulator. Value range: 0.00 to 100.0 kHz. *Should be ≤ Deviation (20). The recommended default value is 0.70 kHz.*

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

24. Code:

This field is active when the selected source, DTMF, is modulated. This allows the entry of desired DTMF digits to use for DTMF source generation.

F1 CLEAR
Clears out any DTMF digits previously programmed in.

F2 CONT
Puts the DTMF Generation in the continuous mode.

F3 BURST
Used to one-shot the DTMF Generator source.

F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

25. Sinad:

This field is used to select a meter to read signals from the Audio/Data/ SINAD input baseband jack. The measurements appear to the right of this field. Valid selections:

Soft Function Keys available with this function include:

F1 DIST
Selects the Distortion meter for baseband measurements.

F2 SINAD
Selects the SINAD meter for baseband measurements.

F3 AF LVL
Selects the AF Level meter for baseband measurements.

F4 OFF
Disables baseband measuring.

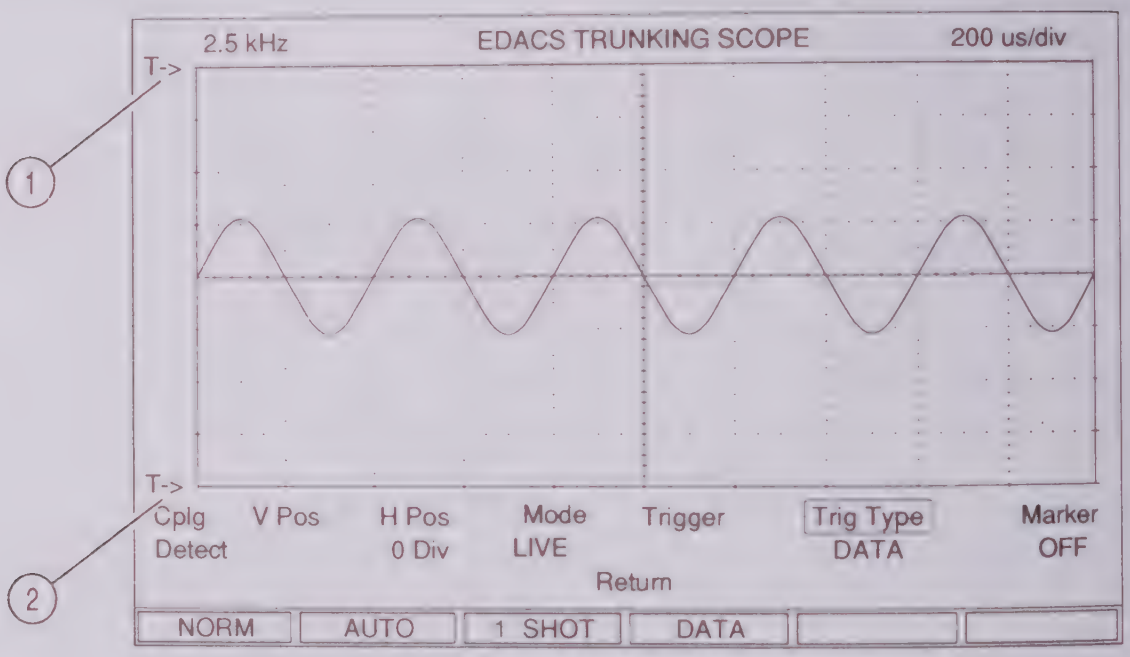
F6 RETURN
Returns to the EDACS Trunking Manual Test Screen.

When baseband measurements are made, all receiver measurements including the DSP data decoding are disabled due to hardware limitations. Therefore an EDACS Call Processing cannot be made with any baseband measurements enabled. The Call Processing must be made first, then the baseband measurements may be enabled during the call.

7-14-9 EDACS HIGH-SPEED DATA CAPTURE (SCOPE)

The COM-120B provides a reliable capture of the data burst.

Access the EDACS Repeater or Radio Simulator Extended Meas Scope.



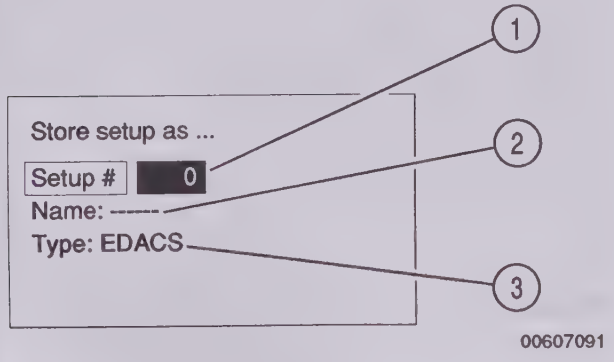
00607090

To view the dotting or barker code before the data, set the horizontal position selection negative. Cursor to the *Trig Type* field. The "DATA" type acts like the 1-SHOT mode, triggering when the High-Speed EDACS data is decoded. Use the START/STOP Hard Key or press the DATA Soft Function Key F4 to re-arm the trigger.

It is very important to set the EDACS Trunking Scope trigger level high (top of screen) or low (bottom of screen) enough to avoid causing a trigger before the EDACS Data Burst occurs. Set the scope trigger level to its maximum (1). If the EDACS Data Burst is not visible, set the trigger level to its minimum (2).

7-14-10 EDACS STORE AND RECALL

The COM-120B provides the ability to store and recall EDACS system configurations. Data is stored to one of 50 standard stored test setups under the *Type* EDACS. Press the STORE Hard Key in any EDACS option screen for this menu window:



00607091

1. Setup #

   Displays selected Memory Location for storage of current configuration.

2. Name

   Displays optional alphanumeric label for selected Memory Location.

3. Type

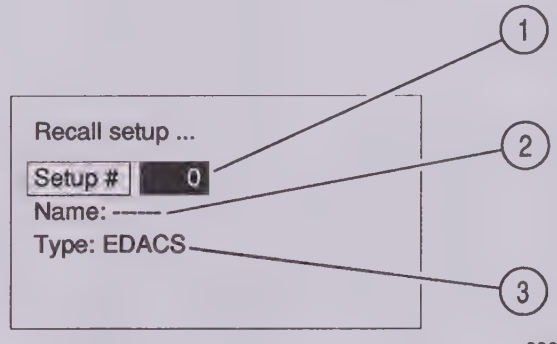
   Displays the type of data currently saved in the specified setup number. Available types to save and recall are: DUPLEX, GENERATOR, RECEIVER, GENERATOR & RECEIVER and EDACS.

   Soft Function Keys available with this function include:

   F1 SAVE
   Finalizes Storage Operation.

   F6 ABORT
   Escapes Storage Operation without editing.

Press the RECALL Hard Key in any EDACS option screen for this menu window:



00607092

1. Setup #

   Displays selected Memory Location for storage of current configuration.

2. Name

   Displays optional alphanumeric label for selected Memory Location.

3. Type

   Displays the type of data currently saved in the specified setup number. Available types to save and recall are: DUPLEX, GENERATOR, RECEIVER, GENERATOR & RECEIVER and EDACS.

   Soft Function Keys available with this function include:

   F1 RESTORE
   Finalizes Recall Operation.

   F6 ABORT
   Escapes Storage Operation without editing.

7-14-11 EDACS TRUNKING OPERATIONAL NOTES

This section provides some notes and hints on operating the EDACS Trunking Option of the COM-120B unit.

Squelch Setting

The squelch knob setting on the COM-120B unit is very important for all testing.

While in the EDACS Trunking Main Screen with no RF being transmitted into the COM-120B unit, turn the squelch knob full counter-clockwise. The green squelch light is ON. Slowly turn the knob clockwise until the green light just goes off (make sure there is no flickering). This setting is valid for all EDACS testing.

Control/Working Channels

If a radio is having trouble locking onto the Repeater Simulator, completing calls or the Radio Simulator is showing NC, check the programming of the Control and/or Working Channels in the Setup menu. These channels must be valid for the particular system under test.

Data Generation

If the radio won't lock onto the Repeater Simulator, won't stay up when being called or the Radio Simulator is having trouble completing calls, check the DATA Mod Source. The DATA Mod Source must be set for FM Modulation. The recommended deviation is 3.2 kHz with a sub-audible deviation of 0.70 kHz.

Logical/Group ID

If a radio can not be called in the Repeater Simulator or can not make a call in the Radio Simulator, check the Group/Logical ID. The Group ID must valid for the system under test.

FM-Zero

If a radio is having trouble completing a Group Call (maybe works 50% of the time), an FM-Zero (FMZ) operation may be necessary. Do this in the Automatic Test using FMZ Soft Function Key F4 while in the idle state, or do it in any manual mode simulator by cursoring to the Deviation field in the left column and pressing FMZ Soft Function Key F3.

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